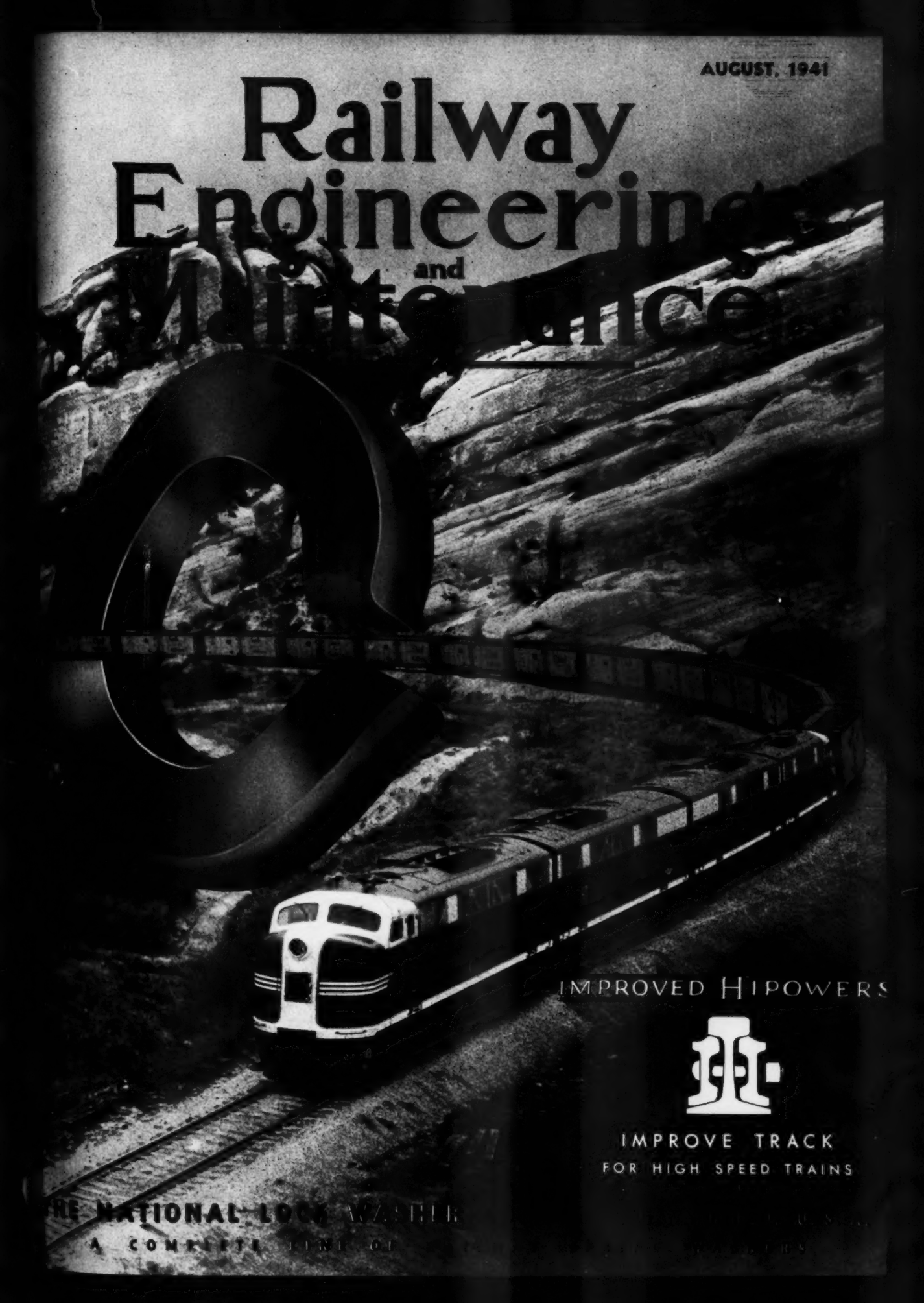
AUGUST, 1941

Railway Engineering and Maintenance



IMPROVED HIPOWERS

IMPROVE TRACK
FOR HIGH SPEED TRAINS

RE NATIONAL LOCK WASHER
A COMPLETE LINE OF

Reliance HY-CROME *Spring Washers*

The Hy-Crome Spring Washer Family through the medium of this and other pages during the past 25 years, have been privileged to bring you their messages acquainting you with the progress achieved and improvements made in our products -- in appreciation of the consideration extended us by various members of the American Railroads we express our thanks. In the future, as in the past, every effort will be made to keep Hy-Crome products abreast of the times and always equal to the task imposed upon them.

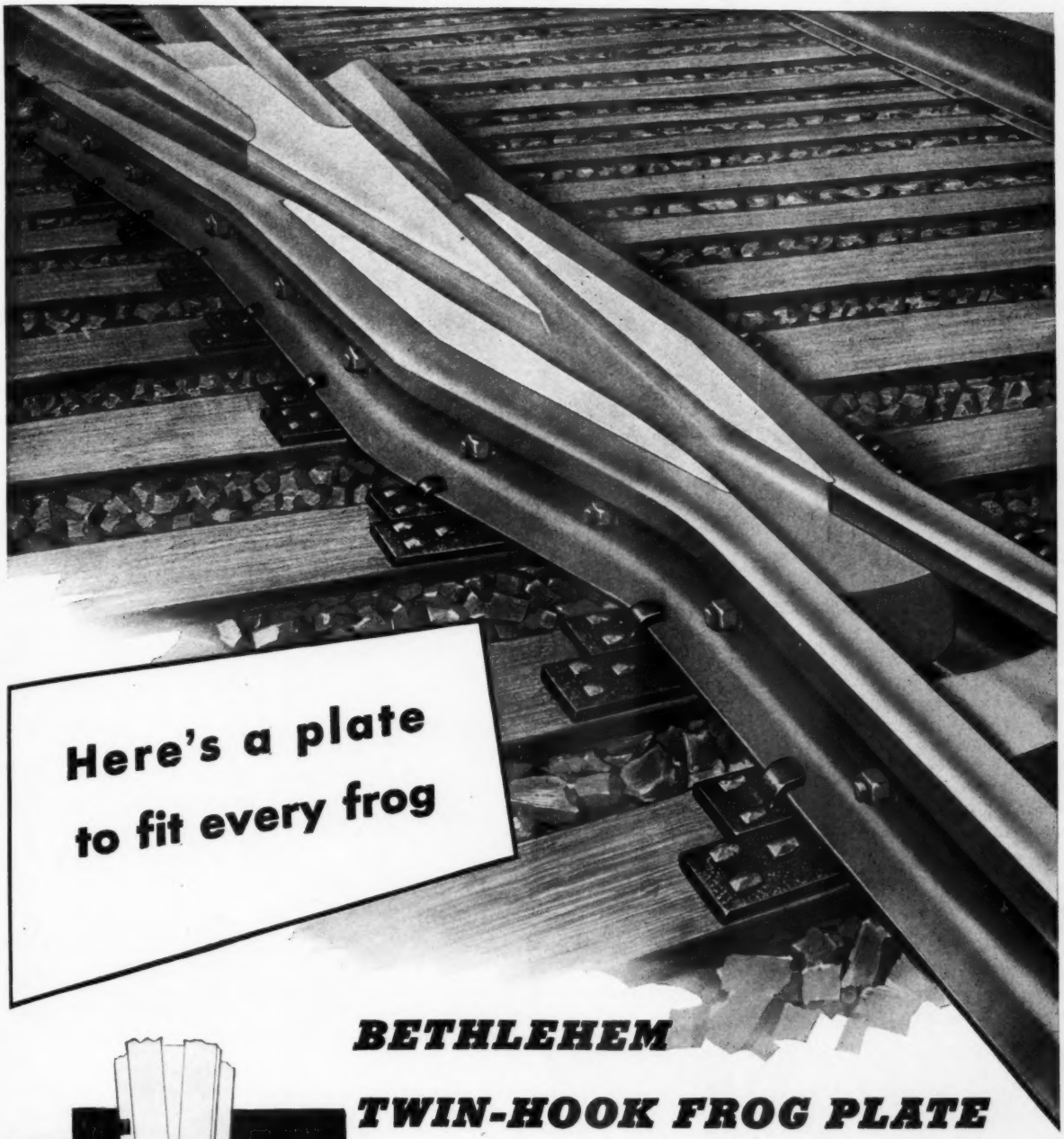
There is a scientifically made Hy-Crome Spring Washer to successfully cope with every bolt problem and the Hy-Crome device of the future will be thoroughly laboratory and field tested for your protection.

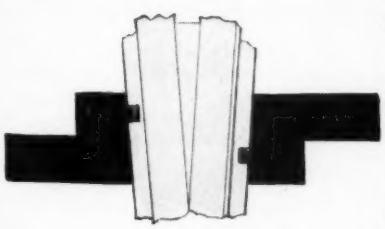
Eaton Manufacturing Company

RELIANCE SPRING WASHER DIVISION

MASSILLON, OHIO

New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montreal





BETHLEHEM
TWIN-HOOK FROG PLATE

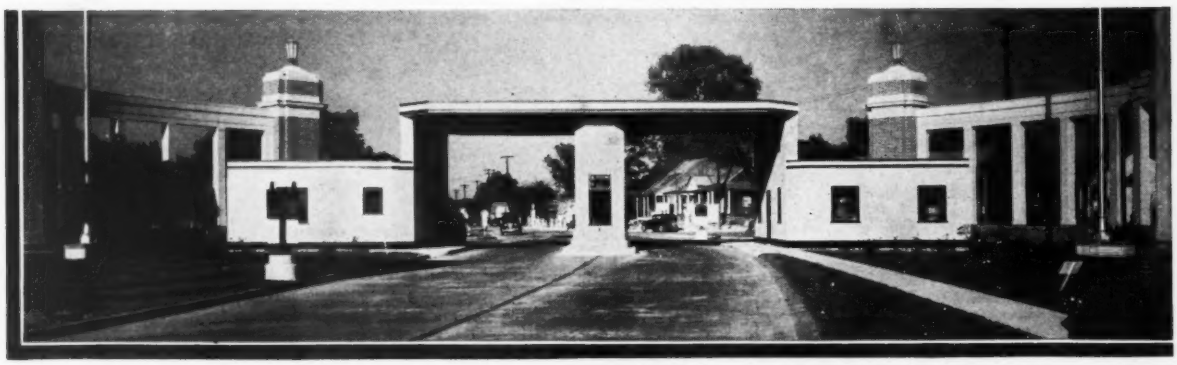
There's no need to bother with costly special frog plates for each tie position or with continuous plates when you use Bethlehem Twin-Hook Frog Plates. A pair of these modern plates can be adjusted to fit every tie position under any frog, regardless of angle, length or type. Roads standardizing on the Bethlehem Twin-Hook Frog Plate need stock only this one type in several different lengths to meet every requirement. Bethlehem Twin-Hook Frog Plates are standard equipment on several major railroads. Write to Bethlehem Steel Company, Bethlehem, Pa., for Folder 390, giving complete data.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

There's a grade or type of Douglas Fir Plywood for every construction purpose!

Each is "grade trade-marked" to make identification and specification easy!



● EXT-DFPA, the water-proof type of Douglas Fir Plywood for permanent outdoor use, was specified as the exterior finish on the striking new Natchez, Miss. Bridge approach toll building. The big 4' x 8' panels produce a beautiful streamlined effect, add great structural strength, minimize labor.

● Douglas Fir Plywood will do scores of railroad jobs better and faster and give you more for your money than materials you are now using! For instance, Plywall, Douglas Fir Plywood wallboard, builds puncture-proof, wind-tight walls and ceilings in stations, offices and residences while lopping weeks from construction time. Plyscord, the utility sheathing grade, makes structures nearly 6 times as rigid as horizontal board sheathing, twice as rigid as fibre board sheathing and 40% more rigid than diagonal board sheathing.

Consider Douglas Fir Plywood the next time you have a construction job of any kind... buildings, freight or passenger cars, etc. There is a type or grade of this marvelous "wood and glue sandwich," made in strict accordance with U.S. Commercial Standard CS45-40, to meet your needs. Each panel is stamped with a distinctive "grade trade-mark" so that you can specify with confidence... and then be positive that you receive exactly what you specified.

The Douglas Fir Plywood Association has published a number of booklets containing a wide variety of data and showing the many ways Douglas Fir Plywood can serve you—*and serve you better.* They're free, of course. To get your copies—or for technical assistance—write Douglas Fir Plywood Association, Tacoma Building, Tacoma, Washington.

● *Above:* Linoleum laid over a Douglas Fir Plywood sub-floor is never disfigured by ugly board marks. Plyscord is the grade to specify.

● *Left:* Plyform, the concrete form grade of Douglas Fir Plywood, serves as sheathing and lining combined, produces smoother concrete surfaces at lower cost. Gives many re-uses.

GENUINE DOUGLAS FIR PLYFORM Concrete Form Panel D.F.P.A. INSPECTED

GENUINE PLYWALL Douglas Fir Plywood WALLBOARD D.F.P.A. INSPECTED

SPECIFY DOUGLAS FIR PLYWOOD BY THESE "GRADE TRADE-MARKS"

PLYPANEL D.F.P.A.

EXT.-D.F.P.A.

GENUINE PLYSCORD SHEATHING D.F.P.A. INSPECTED

DOUGLAS FIR PLYWOOD

Real Lumber

MADE LARGER, LIGHTER SPLIT-PROOF STRONGER

NO PARTS SHORTAGE HERE

...MAKES THEM AS THEY NEED THEM

Slow delivery on vital replacement parts — the result of a sharp increase in demand — causes no headaches in those more fortunate shops which are equipped for making their own spare parts . . . with the aid of Airco Gas Cutting Machines. Car parts and such locomotive parts as side rods, frames, gears, cams, equalizers, guide yokes, boiler plate and driving boxes are quickly and inexpensively flame cut in any quantity needed and as needed by this modern Airco all-purpose cutting tool.

Still further speed of fabrication with resultant lower costs are obtainable by cutting stacks of piled plates with a single oxyacetylene torch and by simultaneously cutting of identical shapes with several torches.

Airco makes available to its customers the services of a specialized staff to assure most efficient use of the oxyacetylene flame and electric arc in the making of numerous repairs and replacements necessary to maintain equipment in first class condition.

Air Reduction

General Offices: **60 EAST 42nd ST., NEW YORK, N. Y.**

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AIRCO WILSON

SERVING RAILROADS FROM COAST TO COAST

The New San Joaquin on The Southern Pacific

A Background

OF

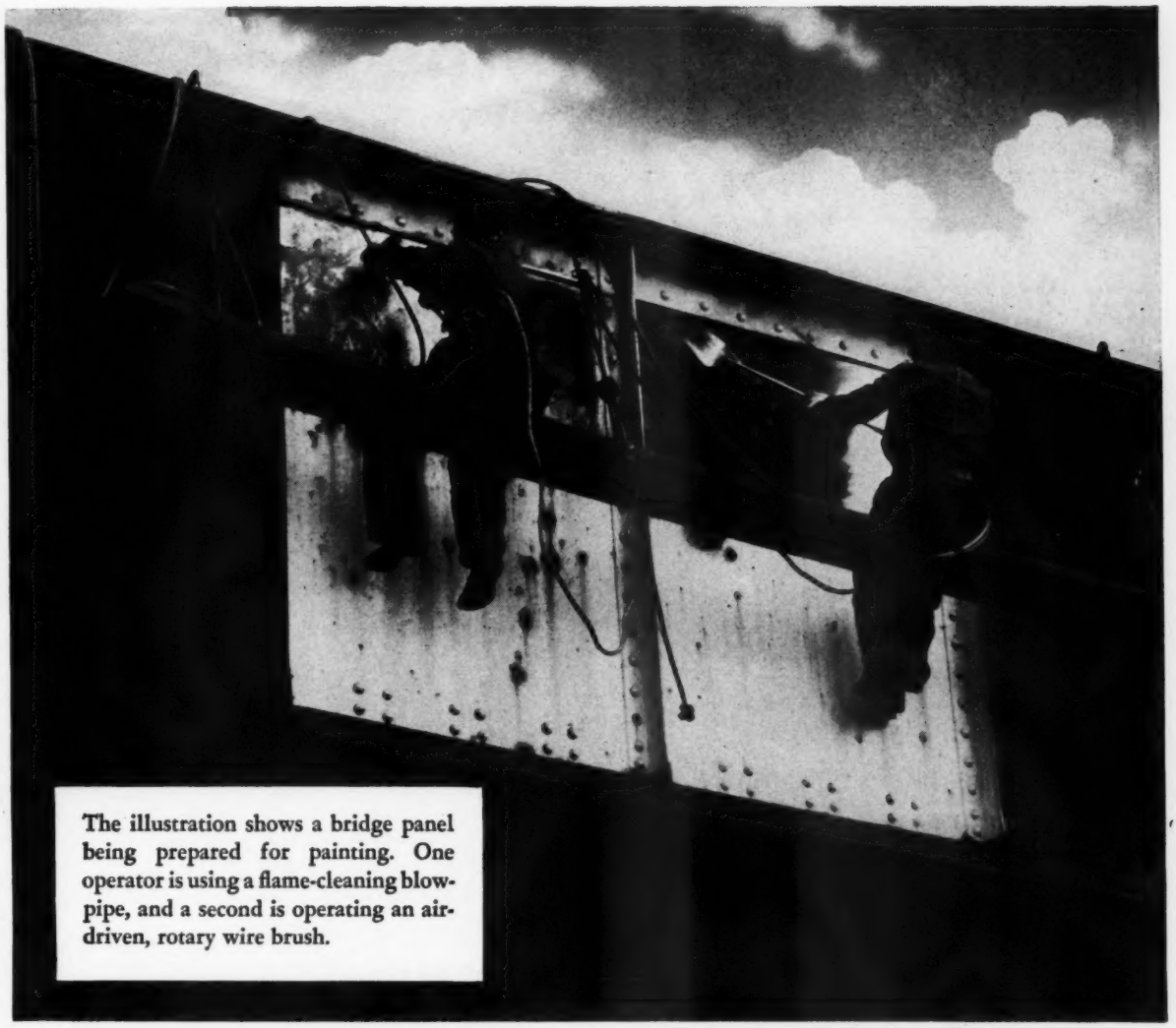
OVER 50 YEARS

SERVING AMERICAN RAILROADS

Enables us to help them meet the unusual problems arising from the National Defense Program.

THE RAIL JOINT COMPANY INC.

50 CHURCH STREET NEW YORK, N. Y.



The illustration shows a bridge panel being prepared for painting. One operator is using a flame-cleaning blow-pipe, and a second is operating an air-driven, rotary wire brush.

Retard Corrosion and Paint Flaking with OXY-ACETYLENE FLAME-CLEANING

• Oxy-acetylene flame-cleaning, followed by wire-brushing, is being used to free structural steel of loose scale and rust before applying protective coatings. After preparation of the steel by this procedure, application of the paint is speeded up and an exceptionally tight bond is assured on the warm, flame-cleaned surface. Flame cleaning also removes surface moisture, a major cause of corrosion and paint-flaking. In many cases it makes possible a longer working day since the painters can start to work early without waiting for sunshine to dry the dew.

THE OXWELD RAILROAD SERVICE COMPANY
Unit of Union Carbide and Carbon Corporation
UCC
Carbide and Carbon Building Chicago and New York

OXWELD RAILROAD SERVICE

SINCE 1912—THE COMPLETE OXY-ACETYLENE SERVICE FOR AMERICAN RAILROADS

The word "Oxweld" is a registered trade-mark of a Unit of Union Carbide and Carbon Corporation.

Cut renewal time *in half* on those remaining ties

The Woolery Tie Cutter cuts the old tie in three pieces which are easily *lifted* out (not *dug* out) without disturbing the crib. See how this leaves a compact bed on which the new tie will seat firmly with a minimum of tamping and of later surfacing.

with the Woolery Tie Cutter

Get Your Ties Out and In Faster The Woolery Tie Cutter steps up renewals per man to 15-18 per day—twice as many as by older hand methods.

Finish the Job and Release Your Men Sooner The Woolery Tie Cutter hastens to completion your remaining tie renewals and frees the men for other necessary work.

Save Money for Those Extra Jobs Use what you save on tie renewals with the Woolery Tie Cutter to carry out extra, unforeseen items of maintenance work that crop up late in the season.

A Woolery Tie Cutter put to work now will pay for itself by the end of the season

TRACK SUPPLY ASS'N. EXHIBITOR ROADMASTERS CONVENTION

WOOLERY MACHINE COMPANY

MINNEAPOLIS Pioneer Manufacturers of MINNESOTA

RAILWAY MAINTENANCE EQUIPMENT

TIE CUTTERS • SWITCH HEATERS • MOTOR CARS

RAILWAY WEED BURNERS • BOLT TIGHTENERS

52 Railways

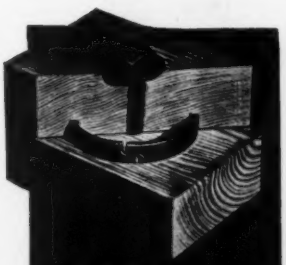
Use TECO Timber Construction

The TECO Connector System has made the economy of timber construction practical for many railway structural jobs heretofore thought possible only with costlier materials.

Roundhouse of the St. Louis & Ohio R. R. (Alton & Southern). Roof trusses are "WOLMANIZED" Southern Pine, jointed by TECO Ring Connectors. Other railway jobs in which TECO construction has been used include:

OVERHEAD CRANES
TIMBER BENTS
TRESTLES
WAREHOUSES
COAL POCKETS
AUTO LOADING DOCKS
COALING TOWERS

By strengthening the structure at the joints, TECO Connectors permit lighter members to perform heavier tasks. Old-style plates, angles, and straps are eliminated . . . and timber members may be prefabricated and pre-assembled, making for speedy, inexpensive erection.



TECO Ring Connectors spread the load on a timber joint over practically the entire cross-section of the wood.

Write Department F-8 for FREE Booklet — "Railroad Timber Structures Made Stronger and More Economical with TECO Joint Connectors"

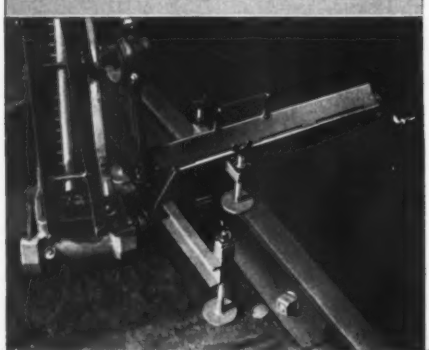
TIMBER ENGINEERING COMPANY, INC.

1337 CONNECTICUT AVENUE WASHINGTON, D. C.

Tighten Joints Screw in Spikes Drill Rail with the NORDBERG POWER WRENCH

Removing nuts at joints ahead of the rail laying gang.

Driving in screw spikes with accessory attached to the Power Wrench. The overload release throws out automatically when the screw is tight.



Power Wrench converted to Rail Drill with this drilling accessory which is quickly clamped to the rail by a hand crank and adjusted to height with thumb screws. Feed is controlled with a simple hand ratchet.

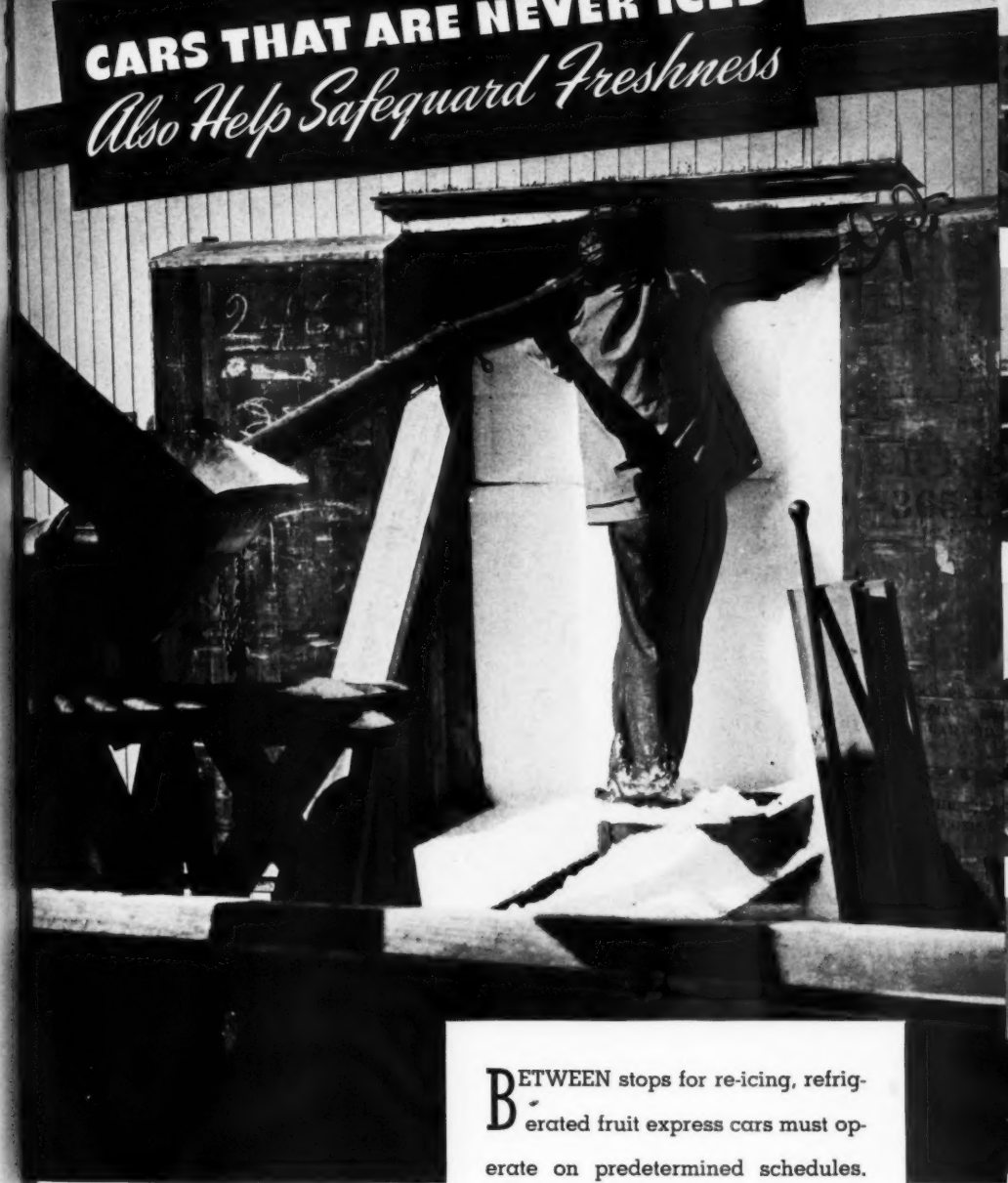
Smooth riding track, prevention of rail end batter and longer rail life are dependent on the uniformity of tension that is maintained on all track bolts. This is assured when bolts are tightened with the Nordberg Power Wrench. Uniformity of torque on nuts is maintained within 5% and is accomplished through an adjustable, spring loaded, overload release which throws out the clutch the instant the desired torque is attained. This rugged, light weight, full revolving wrench is a necessity for periodic joint tightening and for removing and applying nuts when laying rail.

In addition to its use as a wrench, accessories are also available for adapting the machine for driving in screw spikes and for drilling rail. With these quickly attached accessories, the wrench is used for more jobs and brings a far greater return on the machine investment.

NORDBERG MFG. CO.
MILWAUKEE, WIS.

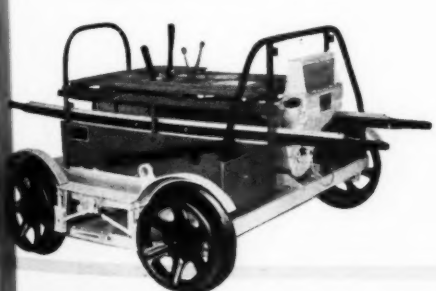
Export Representative — WONHAM, Inc., 44 Whitehall Street, New York

CARS THAT ARE NEVER ICED
Also Help Safeguard Freshness



BETWEEN stops for re-icing, refrigerated fruit express cars must operate on predetermined schedules. Signals and switches must operate perfectly. Tunnels, trestles, and roadbed must be safe for the high speed. Here, Fairmont Railway Motor Cars, by making possible continuous inspections and prompt and efficient maintenance, contribute to safety of operation and safe arrival of perishable cargoes. Fairmont Railway Motors, Inc., Fairmont, Minnesota.

Fairmont
RAILWAY MOTOR CARS



FAIRMONT M9 SERIES D. 1 to 2 men 500-lb. load capacity. Rear lift 95 lbs. Four-wheel brakes. Extension lift handles. Fairmont RO Hy-load roller bearing 5 to 8 h.p. engine.

Performance
ON THE JOB COUNTS

FAIRMONT M9 SERIES C, 1 to 2 man inspection car

FAIRMONT B9 SERIES C car in signal maintenance work

FAIRMONT A8 SERIES C, 85 H.P. engine, for heaviest extra gang work

FAIRMONT M19 SERIES D in track supervisor's service

FAIRMONT M14 SERIES D for all light section service

FAIRMONT S2 SERIES E in standard section work

ROADMASTERS and MAINTENANCE of WAY OFFICERS

PREPAREDNESS

is the order of the day. The railways, like the Army, will face new demands and new problems in 1942. Prepare to meet them by attending the

ROADMASTERS' CONVENTION.

HEAR—discussions on Roadway Machines—Ballast and its requirements—Present-day drainage requirements—Ties and their renewals—Rail end wear, and many other subjects and problems which will demand efficient and economical handling next year. Many solutions will be found in the addresses, the committee reports and the discussions.

And, at the EXHIBIT,

right in the convention hotel, you can see the most modern time, money and labor-saving equipment and materials that have ever been developed to help YOU—whether you're a Roadmaster or a higher officer—do a better job in the coming high-pressure period. Your few days in Chicago will prove to be one of the best investments you can make this year . . . you will be far better equipped to plan a time and money saving program for 1942 and to carry it to a conclusion.

SEPTEMBER 16-18

STEVENS HOTEL

CHICAGO, ILLINOIS

The Exhibit opens at noon, on Monday, September 15, for the benefit of Railway Men who wish to come early to make an unhurried, intensive study of the display. It closes on Thursday afternoon.

TRACK SUPPLY ASSOCIATION

59 E. VAN BUREN ST. **CHICAGO, ILLINOIS**

Are you getting all this from your spring washers?

No spring washer for track bolts should go flat before reaching a practicable and workable bolt tension. Most spring washers do not meet this fundamental requirement.

TRACK SUPPLY ASS'N.
EXHIBITOR
SEPT. 15 to 18-1941-HOTEL STEVENS-CHICAGO
ROADMASTERS CONVENTION

The Verona *Fixed Tension* Triflex Spring provides not only enough free travel to reach adequate bolt tension but also a means of arriving at equal bolt tension in all bolts. Plus, of course, reactive spring pressure more than 2½ times the A.R.E.A. requirements, to maintain this tension after joint wear.

SINCE 1873

WOODINGS-VERONA TOOL WORKS, VERONA, PA.

SINCE 1873

No. 152 of a series

Railway Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO, ILL.

August 1, 1941

Subject: Conventions in Near War-Time

Dear Reader:

"Why don't they cut out the Roadmasters and the Bridge and Building conventions this year—or at least cut them down to two days?" This was a question put to me a few days ago. "Why should they?" I countered. "Because these railway men are so busy on their tracks and structures that they won't come to the meetings," was the reply. "That's the reason they will come," I said. "They can't afford to stay away if they're in earnest in their desire to meet the increasingly severe demands on them."

Is this true? Let me give you a few reasons. In the first place, maintenance officers are in the midst of the largest season's work they have faced since 1931. In many respects, the conditions under which they are working are even more adverse. And the demands of traffic are so large and of such a nature that the work must be done promptly. There must be no failure on the part of maintenance forces, for such a development might endanger the performance of the railways—the first aid in national defense.

Such conditions place heavy responsibilities on every maintenance officer. They must do the tasks entrusted to them in the face of delays and changes in materials, heavy turnovers among and inadequate supplies of men, and sharply increased traffic and even more exacting demands for minimum interference therewith. All these require a high degree of performance. They demand the best in direction, in methods, in materials.

It is in giving supervisory officers help in meeting these new conditions that the conventions of the two associations referred to above enter the picture. These meetings provide opportunity for maintenance officers to meet with other men of similar responsibilities and to exchange experiences and compare notes with them. They enable these men to listen to addresses by men of acknowledged leadership in the field on the needs of the day—to hear the reports of committees presenting the joint conclusions of groups of men on problems like their own and to join in the discussion thereon. And they provide opportunity to study the latest and most efficient materials and equipment available to them, in the exhibit conveniently located and so arranged as to promote study and investigation. Nowhere else can one gather so much information in so short a time regarding his work and the most efficient ways of handling it.

These are the reasons why I believe that the conventions should be held and why I believe further that they should not be curtailed. Rather, present conditions place on the officers of these associations heavy responsibilities to so develop the programs for their meetings that they shall be directed to the problems of today and shall be intensely practical in character. They should be "brass tacks" meetings in every respect. Such conventions can be made to meet the challenge of these days. And with such a meeting, no alert maintenance officer can afford to forego the opportunities to increase his store of knowledge regarding the solution of the problems at hand and immediately ahead.

Am I right?

Yours sincerely,

Elmer T. Howson

ETH:EW

Editor

MEMBERS: AUDIT BUREAU OF CIRCULATIONS AND ASSOCIATED BUSINESS PAPERS, INC.

TRACK SUPPLY ASS'N.
EXHIBITOR
ROADMASTERS CONVENTION

UNIT TYTAMPERS

Do A Better Job Quicker In Out Of Face Or Spot Tamping At Lower First Cost . . . Lower Maintenance Cost.

NOW 75 RAILROADS USE BARCO
Six Years Satisfactory Service

BARCO MANUFACTURING CO.

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1805 W. Winnemac Ave. Chicago, Ill.

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THE HOLDEN COMPANY, Ltd.
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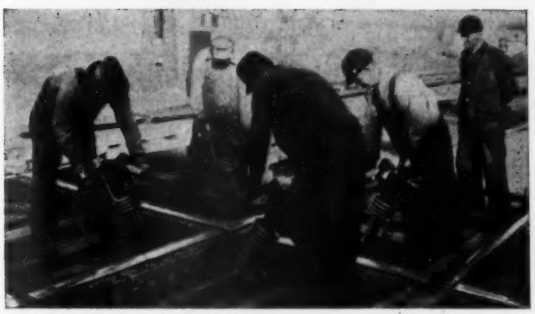
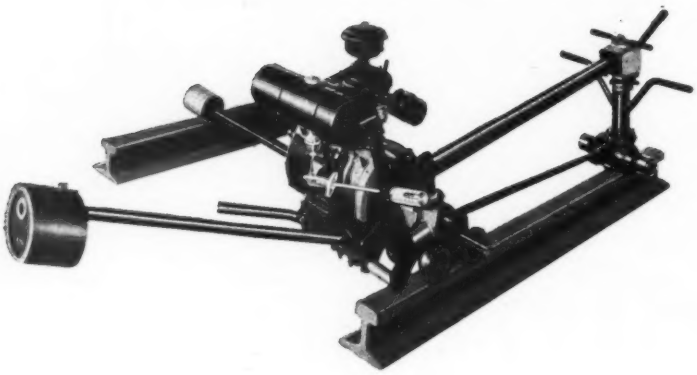


Spot tamping at busy terminals and crossings is quickly and easily handled—no auxiliary equipment in the way.

BARCO Tytampers may also be operated from a small light-weight central power plant for out of face tamping, as shown above. This unit, weighing less than 100 lb., and costing less than $100, is supplying power to 12 BARCO Tytampers.

Raco Power Track Machine



The Raco delivers an exactly uniform power to every nut.

The new Raco Micro Cutout is easily applied to old machines with wrenches and screwdriver. **There are no obsolete Raco Machines.**

Light weight, fast, accurate, smooth operation, quality construction.

Purchased by 59 railroads.

Raco Tie Boring Machine

Bores holes for **screw** spikes or **cut** spikes.

Bores ties in track more than **twice as fast** as any other accepted means.

Bores holes **absolutely vertical.**

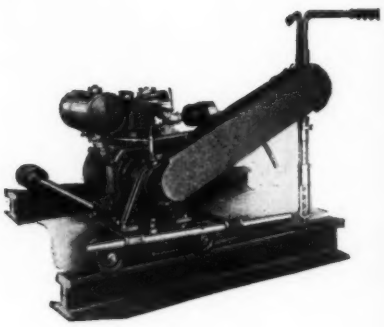
Locates all holes **exactly in center** of tie plate punching.

Automatically **controls depth** of hole.

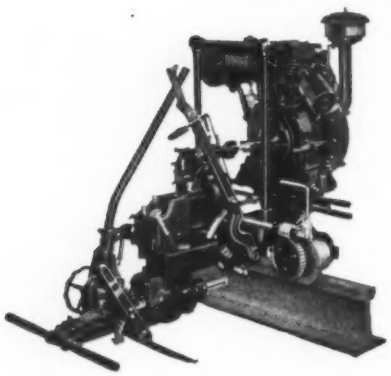
Chips are blown away as fast as made, leaving hole clear.

One-man operation.

Machine can be removed from track by one man.



Everett Power M-W Machine



For fourteen years the Everett M-W has been the **standard** power rail drill on practically all railroads.

Its design and construction insure the utmost in facility of operation and in speed and accuracy of adjustment.

It has made such astonishing records for economy that **no road can afford to use any other means for drilling bolt holes.**

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Main Office

137 East 42nd Street

(Chrysler Building)

New York

Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

AUGUST, 1941

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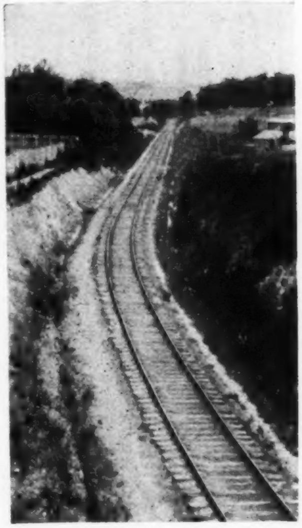

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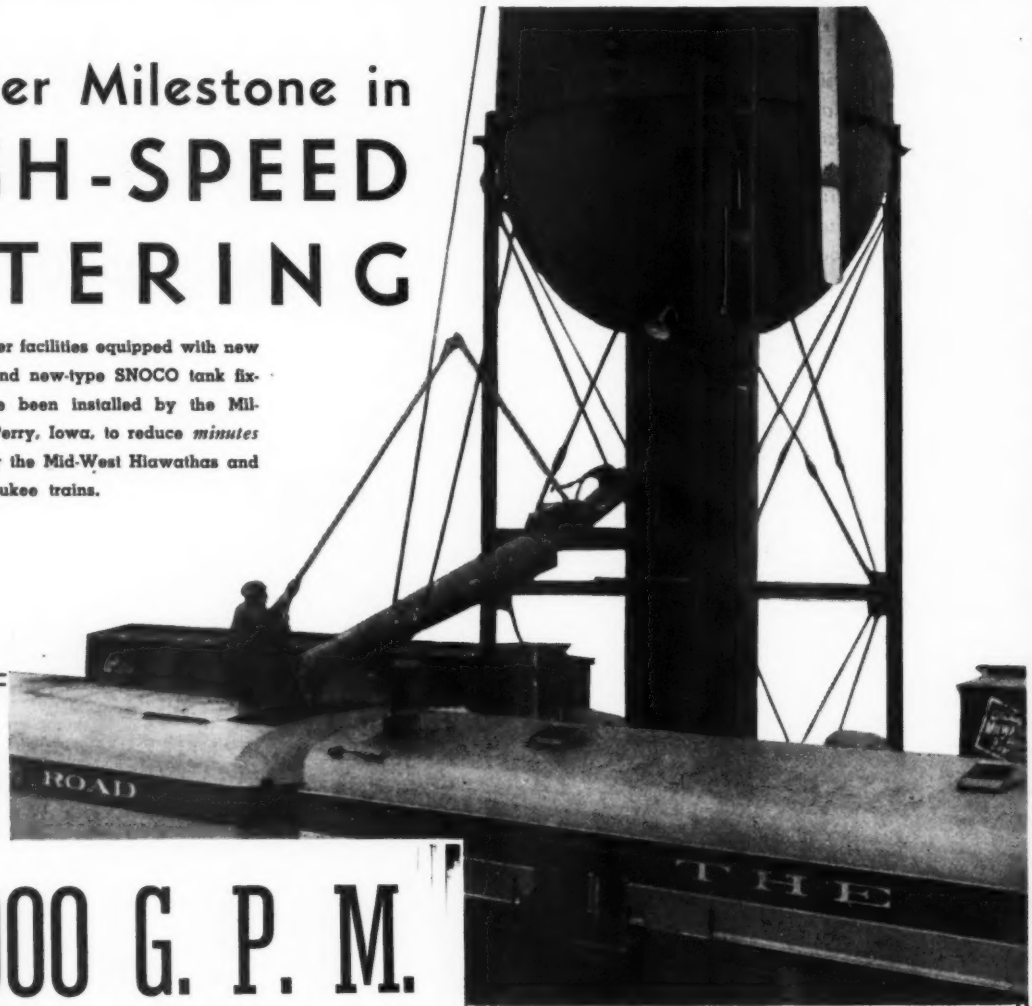
SNOW Does It Again!

Another Milestone in HIGH-SPEED WATERING

Complete new water facilities equipped with new SNOCO hydrant and new-type SNOCO tank fixture recently have been installed by the Milwaukee Road at Perry, Iowa, to reduce *minutes* in taking water by the Mid-West Hiawathas and other crack Milwaukee trains.



4,000 G. P. M.

Water STABILIZED Spout

The scientifically stabilized spout counterweighted for one-man operation will remain stationary in the full delivery position without manual aid, thus practically eliminating the hazard of injury from spout kicking out of manhole.

In addition to its 4,000 gallons-per-minute delivery capacity, this new spout has other desirable features. The fully enclosed frost-proof discharge valve mechanism insures unrestricted operation in winter and also reduces possible maintenance expense to a minimum.

This new-type SNOCO tank spout can be quite easily installed on your existing steel tanks through one port.

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Railway Engineering and Maintenance

In Emergency

Railways' Most Dependable Agency

IT is an interesting commentary on the basic importance of railway transportation to the welfare of the country that in times of national stress like those through which we are now passing, the public turns instinctively to the railways for the service that it needs, and we hear little mention of other agencies. The same is true in periods of adverse weather and floods. This reflects the universal realization that, regardless of fogs, blizzards, and other obstacles, the railways provide the one dependable means of transportation that can be relied on, day in and day out, year in and year out.

Such dependability is valuable at any time; it is doubly valuable when the needs are imperative and failure cannot be countenanced. This dependability of railway service is a characteristic that should be emphasized now, when we as a nation are engaged in such super-efforts. And this dependability in times of emergency does not just happen. It is the result of deliberate planning and preparation by railway managements.

American industry is highly integrated, with many groups participating in the production of a product. Among these participants are the railways, providing essential services from the assembly of the raw materials to the delivery of the finished product. Yet the railways constitute only one link in this integrated chain of industrial production.

Performances

Within recent weeks some segments of the public have shown concern over the possibility of a breakdown in transportation and a resulting paralysis in industry. This fear has been stimulated by statements emanating from persons in high positions in public life. Are these statements warranted? Let us look at a few recent performances. The industries of the country are now loading approximately 900,000 cars of freight a week. This is an increase of about 23 per cent over the loadings of a year ago and nearly 40 per cent over the loadings of two years ago. Yet it is nearly 20 per cent less than the loadings at this time in 1929 and 25 per cent below the volume handled in the peak of 1929.

Looking to the anticipated peak this year, Chairman Eastman of the Interstate Commerce Commission stated during the last month that the Commission anticipates that this peak in loadings will approximate 1,000,000 cars a week this fall. A traffic of this volume will require close supervision on the part of the railways. It is not, however, sufficiently large to cause alarm. With railway officers on their toes as they now are, the railways can handle any traffic that industry is geared to produce. In support of this statement, let us look at two current achievements.

A few weeks ago there was much concern over the ability of the railways to handle the wheat from the harvest fields in the southwest, and the railways adopted numerous measures to meet the situation, including the assembling and storing of thousands of cars in the producing area. Shortly after the movement started, however, it developed that the elevators were so filled with storage wheat that they had little capacity to receive the new crop and were unable to accept it. Facing this situation, a large part of the wheat is being held on the farms and the anticipated tax on railway capacity has been eliminated.

Similarly, in the transportation of ore from the mines to the steel mills, it has developed that the bottleneck in transportation capacity is not with the railways but with the boats for over-the-lake transportation, and that the railways are able to handle far larger tonnages to and from the docks than can be moved by the intermediate agency over the water. In both of these critical transportation situations, it has been shown that the crux was elsewhere than on the railways, and that they were able to meet their demands in full.

Again the daily press has given much publicity to near-hysterical statements regarding gasless Sundays and other manifestations of distress resulting from the transfer of tankers from Gulf-Eastern Seaboard to Atlantic service, yet, surveys show that the railways are prepared to take on this task at once, through the more intensive use of their existing supply of tank cars.

And in passenger service, the railways have transported more than 1,500,000 soldiers, sailors, marines, and selectees during the first six months of 1941. Of these, 60 per cent were handled on 2,861 spcial trains, and the remainder on regular trains, all without interference with a heavier than normal regular passenger traffic occurring during the same period.

Aggressive Planning

As stated above, these performances have not been attained without effort and planning. And further measures to maintain and enlarge railway capacity are

being pressed with maximum vigor. Thus, in the month of June alone more freight cars were ordered than in any of the full years of 1931 to 1935, inclusive, or in 1938, while the number ordered in the twelve months ending with June, 1941, exceeds the total for any calendar year since 1924. And while much publicity has been given these orders, and properly so, it is well to observe that they afford an index also of increasing activities in other branches of service, notably maintenance of way. Here, figures of expenditures for the first five months of the year show an increase of 12.5 per cent, and this spread is increasing rapidly as the season advances, being 17 per cent for May.

Expressed in dollars, the Class I railways alone spent $23,800,000 more in the first five months of this year, or approximately $4,750,000 per month, for the *upkeep* of their properties, while the increase in May alone was $7,500,000. And this figure affords only a partial measure of the extent to which the railways are taking up the deferred maintenance that has accumulated during the depression years and are strengthening their properties to meet the increasing demands. Another and equally important measure is afforded by the expenditure for improvements and additions to facilities, figures for which are not so readily available, although they are rising even more rapidly.

Employees Responsibilities

In such programs, maintenance of way employees have a dual interest and responsibility. First and foremost is that of so directing their activities that there may be no failure of the facilities under their supervision to meet any requirements that may reasonably be expected to be placed on them. A railway is a composite of the activities of many groups and it must be the supreme objective of every group to anticipate and to meet all demands. The future of private administration of the railways is at stake, and no failure or threat of failure to meet the demands of traffic can be tolerated—to say nothing of the importance of adequate service to national security.

After doing his full part to insure adequate functioning of the railways, it becomes a further responsibility of every railway employee to aid in allaying fear among the public regarding the ability of the railways to meet the demands that may be made upon them by pointing out facts such as those cited above, showing the latent capacity of the railways to meet peak loads, the measures they are taking to strengthen and enlarge their properties to meet the further demands that may be in the offing, and the further important fact that, in most if not all cases, the bottlenecks that will develop will appear elsewhere than in transportation. By such efforts, railway employees can do much to promote a better understanding of the indispensable place of the railways in a period of national emergency.

Scrap

Must Now Be Viewed As Material

IF there were ever important reasons in the past for picking up scrap on the railways, sorting it carefully and getting the maximum from it through either sale or reuse, those reasons are still more important today. The huge national defense efforts being made by the country are changing many things on the railways, and not the least important of these is the increased value of their scrap materials.

With the sale value of scrap on the American railways amounting to approximately 50 million dollars annually under even normal conditions, the handling of scrap, in itself, has always been an important factor in railway operations. Today, in view of the largely increased demands for all kinds of scrap for industrial and defense purposes, and the favorable prices prevailing, it is a still more important factor, and from that standpoint alone should be a matter of concern to every railway employee.

But far and beyond the monetary value of the scrap as such, there is now developing, with the growing shortage of materials of many kinds and classes and the certainty that this will become much more serious in certain lines, a new concept towards scrap, and that is, as material. Only recently, during the annual meeting of the Purchases and Stores division of the Association of American Railroads in Chicago, on July 10-11, this thought was expressed by D. C. Curtiss, chief purchasing officer of the Chicago, Milwaukee, St. Paul & Pacific, who pointed out that in view of present conditions, scrap should no longer be considered merely as scrap, but as material, and that emphasis should be placed upon its use on the railways themselves, in so far as possible.

With this thought in mind, many roads are today combing over their released materials more thoroughly than ever before for every item that can be reused in its original state, or reclaimed or reconditioned. In fact, in the case of certain materials, some roads are today searching out units that obviously cannot be reclaimed economically, and are holding them with the thought that if a shortage should develop in these classes of units, they can resort to reclaiming those on hand to fill out essential requirements, even though to do so will be more costly than the purchase of new units if they were available. An example of this is seen on the Atlantic Coast Line, which, according to L. F. Duvall, assistant general storekeeper, in a statement before the recent Purchases and Stores Division convention, no longer limits the sorting of materials to those which can be reclaimed at less cost than new material, but which has been led by the growing difficulty of securing new materials to set aside all materials that are susceptible of reclamation, so that they can be reclaimed or reconditioned for reuse if required.

Men in the maintenance of way and structures department have not been oblivious in the past to the value of materials released from tracks and structures in repair

and renewal operations, but in view of the conditions that are developing, it is not amiss to point out that these conditions are now demanding greatly increased vigilance in this regard. Furthermore, these conditions are calling for still closer co-operation between the using departments and the purchasing and stores departments, to the end that the most effective use can be made of those materials available, and that the using departments will not find themselves confronted with a critical shortage.

Sap Up or Down?

Does Not Affect Service of Ties

NOT long ago several maintenance officers were discussing the service life of ties and the causes of tie failure, when one of them brought up the subject of winter-cut and summer-cut timber. He insisted that ties cut in the winter are inherently better than those cut in the summer and that they invariably have a longer life. He also insisted that, after ties have been in service for a few years, it is possible to distinguish between those that have been cut during the respective seasons.

This attitude reflects the belief that formerly prevailed widely that the sap in the tree is "up" during the summer when the process of growth is active, and "down" during the winter when this process is dormant. It was also generally believed that deterioration of the wood was caused by fermentation of the sap, and that because there was less sap in the winter, timber cut at this season was able to resist decay for a longer time. It is only in recent years that, through persistent study, the processes of decay are coming to be understood, and with it the knowledge that both of these former beliefs were in error.

While the process of growth is arrested during the winter, it is now known that the wood in the living tree may actually contain more moisture during this season than in the summer, although the food elements contained in the summer sap may be reduced or absent. Furthermore, while the sap of certain trees may contain sufficient sugar during the growing season to cause superficial fermentation, the real cause of decay is the destruction of the wood fibre by fungi that feed on the material in the cell walls. In the light of these facts, it is evident that, so far as the tree and the condition of the sap are concerned, it makes no difference whether the tie is cut during the winter or the summer, for infection by decay-producing organisms will produce the same undesirable results in either case.

On the other hand, there is reason for preferring that the tie be cut in the winter, for this is the season when the decay-producing organisms are dormant and the spores from these organisms are less plentiful, so that the danger of infection is reduced. It is important that, regardless of the time of year, the ties be removed from the woods promptly and sent to the seasoning yard where they can be held under the most favorable conditions with respect to infection until they are ready for treatment. Obviously, the necessity for prompt removal from the woods is greater in the summer than in the winter. If precautions are taken to prevent infection in the woods, it will make no difference whether the tie is cut in the winter or in the summer, and a summer-cut tie that is properly seasoned and treated should have the same life and give the same service, other factors being equal, as one that is cut in the winter.

Manpower

Maintenance Forces Must Recoup Losses

THE maintenance of way department has already lost hundreds of skilled men to the armed forces and defense industries of the country, in spite of the fact that to date our huge national defense effort is barely getting well under way. And on every hand there are signs that there will be further serious losses from railway service. Only recently there has been talk of diverting 100,000 trained mechanics and other mechanically-skilled men from the railways to the shipyards and other defense industries, many of whom would, unquestionably, come from the maintenance of way department. Such proposals portend a serious situation for the railways, and of still greater concern, they overlook the serious handicap that they would place on an agency upon which adequate defense is so heavily dependent—in fact, an agency upon which the success of our entire national defense effort depends, whether it be in the movement of foodstuffs, raw materials, fuel, ordnance or troops.

That the railways have a large number of men in their mechanical and maintenance of way and structures departments who would be highly valuable in any defense industry goes without saying, but in view of their losses already among these men and the heavy demands that are being made on their equipment, tracks and structures to meet the growing needs of industry and national defense alike, further large-scale deflections among their ranks would be of serious consequence. That there will be further losses, however, is a fact that must be faced by every maintenance of way officer down to and including foremen. Unquestionably too, these losses will be largest among those men who have had mechanical training or experience, or who are equipment minded, which becomes doubly serious as the railways are depending more and more upon machines and power tools for carrying out their work.

In a situation such as this, the one practical cushion to the shocks that would otherwise come is for maintenance officers to be constantly training new men in the operation and maintenance of their equipment, who can step in and carry on with the least possible disturbance of normal production and efficiency. This will not be an easy task, but to neglect it is to court poor performance of equipment, breakdowns, and, withal, the costly disruption of normal programs of essential work. In days like these, supervisory officers have no more important duty than to keep their forces to the highest possible level of efficiency, and to be prepared to recoup their losses in skilled manpower by constantly training new men to step into vacancies that may occur.

Pennsylvania

Crops Rails in Track

USING equipment specially designed for the purpose, the Pennsylvania has introduced the practice of cropping rails in track, the practicability and economy of which have been demonstrated by extensive experimental operations. The original scheme, as described in detail later in this article, was to crop the rails in track, draw them together and rebore them, and then apply angle bars, but it is possible that in the future the application of the idea may also take another form, such as the cropping in track of the rail to be removed at the same time that new rail is laid. In the latter case the cropped rail would be loaded, distributed to its new location and laid, at which time the rails would be bored practically as fast as laid.

A prerequisite to the success of the new practice was the development of portable rail-sawing and drilling equipment of such a character as to permit these operations to be performed in the track with economy and dispatch. To this end the problem was placed before the Railway Track-work Company, and as a result of the joint efforts of this company and the railroad's engineering department, a rail saw and a gang drill were developed, which have demonstrated their ability to accomplish the desired results. Also, as a means of expediting the work, certain supplementary pieces of equipment have been devised by the railroad, which include a rail puller and a special mounting for a power adz. The function of the former, which is for use when the cropped rails are not removed, is to pull the rails together after their ends have been cut off, while the adz is used to reduce high places in ties that would otherwise interfere with the spindle head on the gang drill.

The Rail Saw

Of special interest is the rail saw that is used in the cropping operations. This unit consists of a four-wheel chassis carrying a 95-hp. water-cooled gasoline engine which actuates the rail saw through a V-belt drive. The saw consists of a steel-center abrasive wheel, 32 inches in diameter, with a 4-inch abrasive rim. After experimentation with various abrasives, a cutting wheel was secured which cuts the rail quickly without bluing the rail steel, producing a clean cut without slag over-run. Experience has shown that the rail saw is capable of cutting a 130-lb. rail in a maximum of 30 seconds and that from 30 to 35 cuts can be made with one wheel before the 4-inch abrasive rim has been consumed. The steel centers are then refilled by the manufacturer for reuse.

The rail-cropping unit is designed to make cuts in one line of rails at a time. The cutting wheel is mounted between the forward and rear wheels of the chassis and on the inside of the rail, and the cut is made by forcing the wheel through the rail from this position. To secure the necessary lateral

Below — The Portable Rail Saw in Operation, Cropping a 130-lb. Rail

Above — A Close-Up View of the 32-In. Steel-Center Abrasive Cutting Wheel, Showing the 4-In. Abrasive Rim, and Two Cropped Rail Ends

Convinced of the inherent advantages in cropping the ends from rails in track, the Pennsylvania has conducted extensive development work along this line. For this work a portable rail saw and a gang drill have been devised and have proved highly satisfactory in service. These and other special units of equipment used in the work, as well as the methods and organization employed, are described in this article

Above—The Rail Puller, Shown in Operation in This View, Embodies Two Horizontal Drums Mounted on a Push Car. Left—The Special Clamp and the "Shoe" Used to Pull the Rails Forward

movement for this purpose, the cutting wheel and the power plant are mounted together on a carriage which embodies rollers operating on transverse guides. The necessary transverse movement of the carriage for feed purposes is secured by means of a hand wheel mounted at the forward end of the machine. A hand crank is also placed at this end of the machine, by means of which the saw may be adjusted vertically or raised into the clear in preparation for removal to another location.

Locking Devices

To secure the rail-saw chassis in a fixed position and in the proper alinement during the cropping operation, a number of locking devices are provided. Among these is a swivel-head brake on one of the wheels. A clamping device is also provided at each end of the machine on the side where the saw is located for locking the machine in position laterally. In each case the clamp consists of a yoke-like arrangement at each wheel, with an arm extending down each side of the latter to a contact with the rail.

The arm on the inside of the wheel is curved at its lower end in such a manner that this end extends under the rail head to a bearing against the web. A rack and pinion arrangement, actuated by a hand crank, is provided for adjusting each of these arms. The arm of each clamp on the outside of the wheel has a shoe or lug at its lower end that bears against the side of the rail head. By means of a rack and pinion, each shoe is forced against the rail by a vertical lever which is provided with a ratchet for locking it in the desired position. Sparks produced by the rail saw are prevented from flying about by a curved metal guard mounted on the side of the machine.

The Gang Drill

The drill that is used in connection with the rail-cropping operations drills three bolt holes simultaneously, although it is expected that later machines will have six drills embodied in two separate gang drills mounted on the same track carriage. With this arrangement it will be possible to drill all the bolt holes for six-hole bars simultaneously. Like the rail saw, the present gang drill also embodies a four-wheel chassis, with the drilling head mounted between the front and rear wheels in such a manner that the drills operate from the inside of the rail. The power plant on this machine consists of a five-horsepower gasoline engine, with the transmission system embodying a belt drive operating a counter shaft which actuates the main shaft through a gear box. The latter shaft is connected with the drill spindles by helical gears.

For feed purposes, both the power plant and the drilling head are mounted on a carriage which moves transversely relative to the track, on two guide shafts mounted on the chassis. The drill feed on this unit incorporates a lever-operated rack and pinion arrangement. To help resist the lateral thrust imposed during the drilling operation, a pair of curved arms are provided which bear against the outside web surface of the rail directly opposite the drills. These arms, which are hinged to permit them to be raised into the clear, also act as the supports for a screen guard that is provided for stopping pieces of metal that may be dislodged when the drills break through on the outside of the web of the rail.

Drill Adjustments

An adjustable feature in the drilling head permits the spacing of the drill spindles to be varied as desired, both with respect to each other and relative to the rail ends. Also, the height of the drill spindles is regulated by means of a precision adjustment which uses the underside of the rail base as the reference point, since, because of surface wear, it would obviously be impractical to establish the vertical position of the bolt holes on the basis of the distance from the top of the rail. Both pairs of wheels on the rail-drill chassis are mounted on eccentric axles in such a manner that, by means of a hand crank, the entire unit can be raised and lowered relative to the wheels, the purpose of this feature being to permit the drill head to

be raised into the clear in preparation for transporting the unit.

Experience with the three-spindle drill has demonstrated that the time required to drill three holes, ranges from about 1½ to 2 min. In this operation, two settings of the three-spindle machine are required at any given joint, one for each rail end. However, as mentioned previously, it is expected that subsequent machines will have six-spindle heads, making possible the drilling of the holes in both rail ends at a given joint with one setting of the machine. Hence, the later machines will be able to drill bolt holes at any joint in half the time required by the three-spindle machine.

High Places in Ties That Might Interfere with the Gang Drill Are Reduced With This Power Adz With Special Mounting

The Rail Puller

The rail puller that has been developed by the railroad for use in connection with the rail-cropping operation consists of an ordinary push car on which has been mounted a two-cylinder gasoline engine. Through a dry clutch and a worm gear drive, this engine drives two horizontal drums, one for each rail, on which wind the pulling cables. To hold the push car in position during the pulling operation, an anchorage cable is provided at the rear end of the machine, which is fastened to one of the track rails by means of a clamp. In pulling the rails, use is made of a specially-designed clamp carrying a small sheave, which is applied to the end of the rail. From the hoist drum on the push car the cable extends through the sheave on the clamp and back to an anchorage on the car.

The rail clamp comprises two members that are fastened together by a hinge connection at one end while their opposite ends are so formed as to fit over the head of the rail. The sheave is mounted at one end of a short arm, the other end of which is shaped like a cam and is held between the two clamp members on a shaft. Any pull on the sheave causes the cam to exert pressure on the rail head, thus tightening the grip of the clamp on the rail. To remove the clamp, a nut at one end of the shaft is loosened and the hinged jaws are spread apart. Another ingenious device that is used in connection with the rail-pulling operation is a runner-like shoe that fits over the end of the rail base and prevents it from impinging on the tie plates or ties as the rail is pulled along.

Special Adz Mounting

The use of a specially-mounted power adz for reducing the height of ties that might otherwise interfere with the spindle head on the rail drill has also been mentioned. This unit consists of a standard Nordberg power adz which is mounted, by means of a turntable, on a four-wheel chassis in such a manner that the cutting head is located at the rear of the machine and can be swung from side to side to reach any desired point between the rails.

At the rear of the chassis is a portal-like metal frame which embodies adjustable stop lugs that permit the depth of the cut to be regulated as desired. This frame, which is removable to permit the cutter head to be raised for renewal of the blades, also embodies hangers by means of which the arm carrying the cutter head can be suspended and fixed in position during the transportation of the unit. All newly-adzed surfaces are swabbed with creosote and a rack is provided on the adze carriage for carrying a bucket of this material.

Methods and Organization

The following paragraphs present a description of the methods and organization that were employed in cropping rails in track at a point near Harrisburg, Pa., on the Pennsylvania's four-track main line. For the purpose of this operation complete use was obtained of the track (the westbound freight main), which is laid with 39-ft., 130-lb. rail with double-shoulder tie plates and four-hole joint bars.

In the cropping operation, 18 inches was cut from each rail end and, after the rails had been drawn together and the bolt holes drilled, 36-inch six-hole reformed angle bars, 1/32 inch oversize, were applied. To compensate for the shortening of the rails and to limit the distance that they must be pulled in drawing them together, a 36-foot rail was inserted in the track at intervals of 12 rails. Second-hand rails on which the head wear was substantially equal to that of the rails in the track, were used for this purpose.

The more important operations involved in carrying out the cropping work and restoring the track afterward, given in the order of their sequence, were as follows: (1) Preparatory work, such as the removal of the signal wires, rail anchors, joint spikes, and track bolts and joint bars; (2) the cropping of the rail ends; (3) the pulling of the cropped rails together; (4) the drilling of the bolt holes; and (5) reapplication of the joint bars, rail anchors and bond wires on the rail cropped in track.

Incidental operations included the withdrawing (and later the redriving) of the spikes in an amount sufficient to free the rail for the pulling operation, and the adzing of the ties where this was necessary to eliminate high places that might interfere with the setting of the drill head at the proper elevation. Also, a rail expander was used to open up tight joints ahead of the rail saw in order to relieve any compression that might be present, for if this compression was not relieved it might result in pinching the cutting wheel during the cropping operation. As another preliminary step, the amount to be cropped from the rails was measured and marked with yellow keel by the supervisor of track, assisted by a helper, who also marked the new locations of the joints. The purpose of the latter step was to insure that the staggered positions of the rail joints would be maintained within the allowable limits.

Details of Organization

The organization employed in the cropping work was composed of 24 men and a foreman. The preparatory work required the services of 6 men, including a signalman who removed the bond wires, 1 man with a Raco power nut runner, who removed the nuts from the track bolts; 3 men with a Nordberg spike puller who pulled the spikes and removed the rail anchors and joint bars; and 1 man with a rail expander, who opened up tight

joints and wedged the rail ends to be cropped to avoid pinching the abrasive cut-off wheel. The rail saw was handled by one operator and a helper. The latter, in addition to helping push and spot the saw, also cleaned away any ballast that might interefere with the saw and checked the blocking that had been placed under the rail ends to prevent the pinching of the cutting wheel.

Directly following the rail saw was the rail puller with one operator, and behind this unit came a laborer who was engaged principally in cleaning ballast away from the ties that needed to be adzed. This man also applied creosote to the adzed ties. Next came the adze, with one operator, which was followed by the gang drill, also with one operator, who was assisted as necessary by the adze operator. Other men in the organization included an operator and a helper with another Raco nut runner, who applied the joint bars and bolts; two men who plugged the spike holes, redrove the spikes and inserted new spikes where necessary; and one man drilling holes for the signal bond wires. These wires were reapplied by the same signalman who removed them. In addition there were two gang watchmen, two flagmen, a telephone operator and a water boy. With the foregoing organization, it was found that an average of 2,340 lin. ft. of rail could be cropped in one day.

All development work involved in designing the special equipment used in the rail-cropping work and in building the field organization was carried out under the general direction of the late Robert Faries, who was assistant chief engineer-maintenance of the Pennsylvania, at the time of his death on September 8, 1940, and under the direct supervision of J. G. Hartley, assistant engineer. As mentioned at the outset, the rail saw and gang drill were developed in collaboration with the Railway Track-work Company.

Rail Fissure In Joint Causes Serious Accident

THE derailment of First No. 71, a passenger train on the Atlantic Coast Line, at O'Neal, Ga., in the early morning of March 30, resulting in the injury of 14 persons, was, according to the report issued by the Interstate Commerce Commission, caused by a rail break through a transverse fissure located within the confines of a rail joint assembly. Adding to the factors which, no doubt, made the derailment more serious than it might otherwise have been, and causing the derailment of all of the cars in the train, was the fact that the rail involved not only broke through the transverse fissure, but at 10 other points in its length. No explanation is contained in the report for the multiple breaks in the rail, but it is stated that only one transverse fissure, at the first break within the confines of the joint bar assembly, was found.

The train was southbound in single-track territory. Its derailment occurred at 3:01 a.m. It was dark, but the weather was clear, and the train, according to its speed-recorder tape, was moving at a speed of 72 m.p.h., which was well within the authorized speed of 80 m.p.h. for passenger trains in this territory.

The accident occurred on the Short line of the Waycross division, between Jesup, Ga., and Jacksonville, Fla., directly at O'Neal, Ga., where a siding 4,500 ft. long parallels the main track on its east side. The specific point of derailment was 341 ft. north of the switch at the south end of this siding. The track in this territory is on a tangent which extends 14 miles to the north, the direction from which the train approached the point of accident, and about five miles to the south. The grade is practically level.

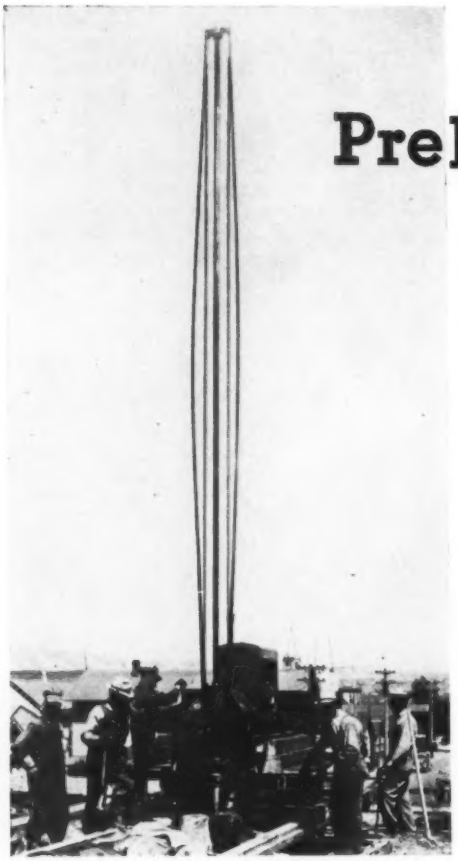
The track structure consists of 100-lb. rail, 39 ft. long, laid new in 1929 on 24 ties to the rail length. It is fully tieplated and single spiked, and is equipped with four-hole continuous angle bars. The track is ballasted with slag and gravel to a depth of 14 in. beneath the ties, and, as pointed out in the report of the Commission, is well maintained.

According to testimony presented at the investigation conducted by the Commission, the rail involved in the derailment broke into 12 pieces. The first break occurred at a point 10 in. south of the receiving end of the rail, and about 1¾ in. inside the south end of the angle bars. This break extended diagonally downward through a transverse fissure in the head of the rail, missed the second bolt hole by about 1½ in., and came through the base at a point 12 in. south of the receiving end. The first piece of rail, which was, thus, about 11 in. in length, remained in the angle bars during the accident, the angle-bar bolts being found intact.

The transverse fissure at this break covered from 90 to 95 per cent of the cross-sectional area of the head of the rail, but had not progressed through the outer edges of the rail section prior to the breaking of the rail. The receiving end of the second piece of rail was battered slightly, but the leaving end of the first piece was not battered. This condition, supplemented by the fact that there was a cut on the right No. 1 engine-truck wheel and a cut on the flange of the right No. 2 engine-truck wheel, indicated, according to the report, that the rail was broken and separated prior to the time the engine of First 71 moved over it. The last train over the track prior to First 71 was a freight, which passed the point of derailment about one hour before the occurrence of the accident. Members of the crew of this train testified, however, that they had observed no irregular track condition at the point in question.

A detector car was operated over this section of track on January 23, 1940, but no defective condition was revealed. The roadmaster on the territory involved testified that he had inspected the track in the vicinity of the point of accident on March 27, three days prior to the accident, and that at that time there was no defective condition that could have been discovered by visual inspection. The section foreman in charge of the territory testified that his track is inspected two or three times a week, and that a special inspection is made each Saturday. He said that the last inspection of the track in the vicinity of the accident, prior to the accident, was on Saturday afternoon, March 29, the day before the accident, this inspection being made on a motor car. He stated that no defective condition of the track was found at the time of this inspection.

In the light of the facts brought out by the investigation, the conclusion of the Commission was that the accident was caused by a broken rail as a result of the presence of a transverse fissure. However, it stated that, "from the investigation of this accident, it is questioned whether inspection of the track in this territory is sufficiently frequent and thorough to insure that the track is properly maintained for the maximum authorized speed of 80 m.p.h."



Being Provided With a Removable Transverse Track of Its Own, the Push Car on Which the Drill Was Mounted Could Be Quickly Shifted Into the Clear

Preboring Pile Holes Simplified This Falsework Problem

When the Union Pacific undertook the construction of falsework to carry three busy tracks across the location of a proposed highway subway at Rock Springs, Wyo., it found that, because of adverse subsoil conditions and a high density of traffic, it would not be practicable to drive the piles for the falsework. As related in detail in this article, the problem was solved successfully by preboring the holes for the piles with a power-operated earth drill

THE preboring of holes for piles by means of a power-operated earth drill, was the expedient by means of which the Union Pacific recently solved the problem imposed in the construction of a highway subway by the necessity of placing falsework piles under heavy traffic in subsoil of such character that the driving of the piles would not have been practicable. By this means, holes for a total of 120 piles, each 25 ft. long, were bored in 12 days, in spite of the fact that the work was carried out on three busy tracks, including two main lines and a yard lead. An important factor contributing to this progress was the fact that the earth drill was so mounted and set up that, in clearing for trains, it could quickly be shifted laterally from one track to another, or to and from the same track, without serious loss of working time.

Nature of Project

This work was carried out in connection with the construction of a highway subway at Rock Springs, Wyo., which was built to carry M street under two main lines and seven yard tracks of the Union Pacific. The actual work of constructing the subway was performed under a contract awarded by the Wyoming State Highway Department, but to the railroad fell the important task of constructing the necessary falsework to carry railroad traffic during the work of excavating for the subway and constructing the substructure.

Briefly, the proposed subway, having a length of 115 ft. and providing a 30-foot roadway, is a single-span structure, consisting of two reinforced concrete abutments carrying a superstructure of wide-flange beams with a deck of wrought-iron plates. The plans called for box-type abutments, 17 ft. wide at the base, each embodying a pedestrian passageway 6 ft. wide.

In constructing the subway it was decided to take six of the yard tracks out of service and to handle all traffic during the construction period over the two main tracks and the yard lead. Hence, there was a high concentration of yard traffic over the lead track during the course of the work. Also, it is pertient to mention that the site of the underpass is only about 200 ft. from an important coaling station and water cranes, where all road freight and yard locomotives, and a large portion of the passenger locomotives stop for either or both coal and water. In fact, at times during the course of the project there was a congestion of trains at the coaling station or water cranes.

Details of Falsework

To carry the two main tracks and the yard lead during the construction work, a temporary six-span bridge, 136 ft. long, was built for each track. In each bridge there were two main spans, 37 ft. 10 in. long, each of which extended over the location of one of the subway abutments. Adjacent to each of these main spans there were two 15-foot approach spans. The main spans were comprised in each case of four 33-in. 240-lb. wide-flange beams supported on timber-pile bents, each consisting of 10 piles arranged in a double row. The approach spans were of timber-stringer construction, being supported at the extreme ends of the bridge on timber sills and at the first panel point from each end on a single five-pile bent. Thus there were three double-bents and two single-bents, comprising a

total of 40 piles, in each bridge. Hence, the construction of the three bridges required the placing of a total of 120 piles.

As a preliminary step in the construction of the temporary bridges, eight test holes were made with an eight-inch auger and churn drills. These test holes varying from 25 ft. to 35 ft. in depth, showed that there was considerable variation in the subsoil conditions and in the depth of the sand, shale and sandstone strata that were encountered. However, on the average, the tests showed that the subsoil consisted of 3 ft. of ballast and cinders, 5 ft. of sandy gravel carrying a small amount of clay, 8 ft. of densely-compacted damp yellow sand with a trace of clay, 4 ft. of hard shale, and 3 ft. of more or less soft sandstone, which was also damp. Hard sandstone was encountered generally at a depth of 22 ft. to 25 ft. below grade. When the holes were prebored for the piling, this log was found to be generally correct, allowing for the pitch of the strata.

Since the bases of the abutment footings were established at a level 25 ft. below the base of rail, it was apparent that it would be necessary for the falsework piles to extend through the shale and well into the sandstone to prevent slippage or undermining during the excavation for the footings. Incidentally, it is of interest to note that during the excavation work the contractor found it necessary to use demolition tools to break up shale and sandstone throughout much of the lower four feet.

Test Piles

An attempt was made to drive two test piles at this location. One of these, a stright-grained fir pile fitted with a steel point, was driven with a track-mounted pile driver equipped with a 6,800-lb. steam hammer for 1 hr. 20 min., at the end of which time it had been driven 16 ft. 6 in. This pile gave every evidence that it had suffered structural damage. Similar results were obtained with the second test pile, which was driven at a location 90 ft. from the first pile, except that 6 in. more penetration was obtained.

In view of this experience with the test piles, it was clearly evident that it would not be practicable to drive the piles for the temporary bridges by the usual methods. Moreover, the soil structure was such as to preclude the jetting of the piles. It was obvious, therefore, that it would be necessary to devise some other method of sinking the piles to the required depth. Further, since the contractor was already unloading his equipment at the site and was anxious to complete the project before the onset of cold weather, it was imperative that the work of constructing the falsework be expedited as much as possible.

It was then decided to prebore the holes for the falsework piles, using a Buda-Hubron earth drill with a 16-in. auger. The drill used was of the skid-mounted type and was powered with a gasoline engine which was connected through a gear box with a vertical splined shaft carrying the auger at its lower end. The auger was comprised of a plate shaped in the form of a helix, and was provided with a check valve to prevent the loosened earth from dropping back into the hole.

Push-Car Mounting

For use on this project, the drill was mounted on a track push car, with the auger projecting beyond one end of the car. To give mobility to the drill, to the end that it could be shifted quickly from point to point to take advantage of short intervals between trains, a transverse system of trackage, extending entirely across the three running tracks, was devised for installation at the track level at the locations of the different lines of bents. In the push-car trackage, each line of rails consisted of a 2-in. by 4-in. timber, forming the rail, which was nailed to the flat side of a 3-in. by 12-in. plank. These planks were laid transversely on the running rails and were blocked up as necessary in the spaces between the rails and the tracks. This trackage was so constructed in sections that those parts spanning the railroad tracks could be readily removed (and replaced) to permit the passage of trains. Also sufficient lateral extension of the push-car trackage was provided so that the drill could be wheeled into the clear.

To assure that the push-car rails would be held to the proper gage, tie rods were provided, each of which consisted of a ¾-in. steel rod in which 3-in. sections at the ends were bent at right angles. At intervals, pairs of holes were bored in the 3-in. by 12-in. planks at points opposite each other to receive the 3-in. legs of the gage rods.

To prevent the motor end of the push car from tipping up when a deep heavy bore was being made, a light track tie was placed crosswise on the push car rails under the auger end of the car and heavy oak wedges were used to take up the slack. A metal band, 12 in. to 15 in. high, cut from a metal barrel end, was also set in place at each pile hole for the auger to bore through. This band prevented spalls and loose earth from rolling back into the hole, and also provided a wall for workman to shovel against when removing excavated material.

Three men were employed regularly in the operation of the drill, including the operator and two laborers, with a fourth man being used at times when long moves were necessary. The sequence of operations that was involved when spotting the drill for boring a given hole included the placing of the two running planks, insertion of the gage rods, rolling the car into position, and inserting the blocking under the auger end. These operations, as well as those involved in the reverse movement, that is, in clearing the track for a train, required about three minutes.

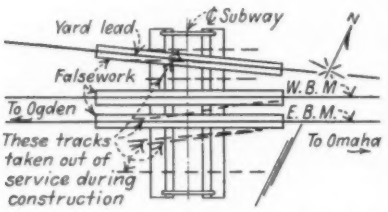
Method of Operation

To the end that the auger would be in operation a maximum amount of time, no attempt was made to bore the holes in a given bent or line of bents in consecutive order; rather they were bored at random, moving from track to track in order that no time would be lost while waiting for a particular track to be cleared. Under this system of operation, work on any hole could be stopped at any depth, with the idea of resuming work on the same hole at a time when traffic conditions permitted.

It was the practice during the drilling work to set up the auger on a

Close-Up View of the Power Drill in Operation. After the Piles Were Inserted They Were Given a Few Blows With a Steam Hammer (Shown at the Left Side of Illustration)

particular track only if a period of 15 min. or more was available on that track. Because of traffic conditions, much of the boring was done intermittently and in short periods, with the drill being shifted back and forth on its track at freqent intervals. To permit the use of the machine to be planned with maximum efficiency,



Location Plan of the Track and Falsework Layout at the M-Street Subway

a portable telephone was set up at the site, with a connection to the dispatchers' line.

Owing to the small amount of clay that was encountered in the eight-foot stratum of damp yellow sand, a minimum of caving occurred in this material. It was found that the cutting lip that was attached to the helix of the auger had the effect of producing a smooth wall in this sand, which did not break down except under heavy vibrations produced by traffic or occasionally when an adjacent pile was being hammered.

Insertion and Driving of Piles

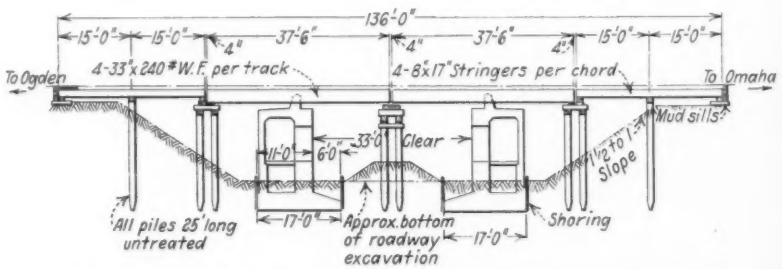
After a given hole was finished to the required depth, the pile, with a squared point, was placed in the hole and given a few blows with a 6,800-lb. steam hammer to compact any loose borings that might be present in the bottom of the hole. After the pile had been placed, dry sand was run in around it to fill the voids and in general to consolidate the pile in the hole. All bents were provided with sway and tower bracing as the excavation work by the contractor permitted. It was reported that the piles were in perfect alignment and that the bracing was easily applied. All materials employed in the construction of the falsework were handled into position by a locomotive crane which had a boom of sufficient length to reach across the three tracks; thus this crane could be kept in the clear of trains.

An average of 35 to 40 min. was required to drill each of the pile holes to a depth of 22 ft. to 25 ft. All the holes, totaling 2,108 lin. ft. in length, were drilled in 12 days, and the entire project of constructing the 18 spans of falsework was completed in 22 days.

If the soil conditions had permitted and an attempt had been made to drive the piles with a track driver embodying a steam hammer, it is pointed out by those in charge of the work for the railroad that a number of serious difficulties could have been encountered. For instance, because of the short intervals between trains, there would have been some days during which it would not have been possible to drive any piles, for after a pile is started it must be driven below the top of rail for clearance before trains can pass. Further, since this work was carried out at a location that was almost immediately adjacent to an overhead footbridge on one side and, as noted previously, a coaling station on the other, it would have been necessary to lower the pile-driver leads each time the machine cleared for a train. It was estimated that it would have taken at least twice the time, or 44 days, to drive the piles with a track driver, as compared with the time that was actually consumed in preboring the holes.

Another alternative would have been to employ frame bents for supporting the temporary bridges, which could have been installed by stringering up the tracks and excavating as necessary, the excavation being protected by sheeting as the work progressed. However, it was estimated that the cost of this type of falsework construction would have been much larger than that of installing pile bents by preboring the holes.

Since the holes for the piles were prebored, there was no occasion for doubt as to the location of the pile



Section Through One of the Temporary Bridges, Showing the Piling Arrangement and Its Location With Respect to That of the Subway Abutments

points or their physical condition. No settlement of the piles was experienced; hence no shimming or lining work was required and the excavation and construction work were carried out without the necessity of imposing any slow orders.

Another Project

The earth drill was used also in the construction of falsework preliminary to the construction of a pedestrian subway under seven tracks at C street, at Rock Springs. This structure is of reinforced concrete, rectangular in cross section, and 110 ft. in length.

During the construction of the pedestrian subway six of the tracks were carried on falsework consisting, for each track, of a 26-ft. steel span on timber-pile bents. The construction of this falsework was complicated by the fact that the barrel of the proposed subway is closely paralleled by a circular reinforced concrete sewer pipe 66 in. in diameter, the flow line of which is 12 ft. 6 in. below the top of rail. There is a clearance of only 4 ft. between the sewer pipe and the neat line of the proposed pedestrian subway.

As designed, the falsework for this project contained 24 piles, the center lines of which are only 12 in. from the side of the sewer; also there were 36 piles that are only 36 in. from the sewer pipe. Hence, it is evident that this project required a high degree of accuracy in placing the falsework piles in order to avoid damaging the sewer pipe and to preclude the possibility of the piles encroaching on the limits of the subway. For this reason the power earth drill proved especially useful in preboring holes for the falsework piles on the C-street job.

Based on the results obtained on the M-street project, consideration is also being given on this road to the thought of using an earth drill in conjunction with a pile driver, to prebore a portion of the penetration of structure piles in bridges on heavy-traffic lines. In this application it is thought that the drill will prove of considerable advantage owing to its mobility and the possibility which it offers of continuing the operations during those periods between trains when a pile could not be started and completely driven.

Also, it is pointed out that there are many off-track applications where the use of the machine will result in reduced costs. These include many operations such as the drilling of shallow wells, test pits, and holes for building foundations of all types, pole lines and stockyards.

A General View of the Station and Annex, When the Cleaning Work Had Been Partially Completed, Showing the Striking Contrast in Appearance Between the Cleaned and Uncleaned Portions

Old Passenger Station Gets Its Face Washed

This article describes the effective methods used to clean from the exterior of the Illinois Central's station at Chicago, grime and soot which had accumulated since 1893, the year the station was constructed

RECENTLY, the Illinois Central decided to clean 47 years' accumulation of grime from the exterior of its Central Station at Chicago, and, in addition, to do considerable cleaning and redecorating of the interior; work that was completed with astonishing results. This station, which adjoins Michigan boulevard and Roosevelt road, or 12th street, in Chicago, consists primarily of two parts, the station proper, built in 1893, and an office annex, added as a southwestern extension or wing in 1901-03. The station proper includes the trainshed, passenger terminal facilities and an office portion eight stories high, and is of brick construction, with granite trim around the windows and doorways. The office annex is 10 stories high and is also of brick construction, with Bedford stone trim around the windows and doorways.

Heavy Accumlation of Dirt

Although the brick on both the station proper and the annex were principally a light shade of tan, with the exception of an inner wall, which will be mentioned later, the appearance of the entire station had become a dull dingy black because of a heavy accumulation of dirt and soot which was heavily caked. This accumulation of dirt and the various types of surfaces to be cleaned created a difficult problem, and it was decided to contract the cleaning job to a firm experienced in this type of work, including also tuck pointing brick and masonry as needed and caulking around all windows.

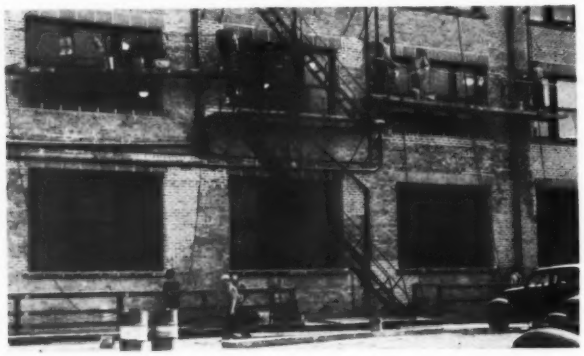
Three types of cleaning were employed on the building; steam washing, using dilute muriatic acid and low pressure steam; a combination of steam washing without acid, followed by wire brushing; and sandblasting. Steam washing with acid was used on all brick surfaces; sandblasting was used on the granite trim of the station, and steam only, followed by wire brushing, was employed on the Bedford stone trim of the annex. Except for extremely stained conditions, sandblasting was not employed on the Bedford stone trim because of its pitting action on this type of stone.

Steam Washing

Before starting the work, the contractor made a trial test to determine what strength acid to use for steam washing the brick, and a six to eight per cent solution of commercial muriatic acid (hydrogen chloride) was found to give the best results. This solution was applied by fiber brushes and then removed with low-pressure steam consisting of about two-thirds hot water and one-third steam. Men on scaffolds painted a course 2½-ft. to 3-ft. wide with the acid and then applied the steam at a nozzle pressure of 35 to 45 lb. by means of a small booster pump on the ground. Two men worked on each scaffold, and one man on the ground supplied the men on each scaffold with wooden buckets of muriatic acid of the proper concentration. The men working with the acid wore rubber gloves, shoes, coats and pants.

In its cleaning action, the acid acted principally to loosen the bond between the caked layer of dirt and the surface of the brick or mortar. The application of the steam blew or washed off all the accumulation of dirt, leaving the original surface of the brick and mortar joints perfectly clean. Because

of the dilute character of the acid, and because it was neutralized immediately by the steam and hot water, no chemical action took place between the acid and the wall surface. The action of the steam and hot water in neutralizing the acid was twofold; it further diluted and washed away the acid with the dirt, and the hydrogen chloride was converted into a gaseous state at the temperature of the steam. This conversion into a gas when the steam was applied also aided in separating the dirt from the wall. In this work, adjacent stone masonry was thoroughly wetted before the application of acid on the brick, so that any acid drip struck wet stone and had no effect on the masonry.



Following the Cleaning, the Joints of the Brick Surfaces and Masonry Trim Required a Large Amount of Tuck Pointing

Sand Blasting

In the sandblasting of all granite trim on the old depot section of the station, washed and dried sand (known as No. 12 flint shot) furnished from a special tank and fittings, was used with an air pressure of approximately 75 lb. at the nozzle. The nozzles were from ¼ in. to ⅜ in. in diameter. When sandblasting close to windows, a steel hand shield was held along the jamb between the nozzle and the window to protect the glass. No sandblasting was necessary on any brick surface, nor was it used on the Bedford stone trim on the annex, except for extremely stained conditions. As mentioned previously, the Bedford stone trim was cleaned by wire brushing and steam. In the sandblasting work, one man worked alone on each scaffold, and one ground man was required for each scaffold man. The men doing the sandblasting wore masks and respirators.

Tuck Pointing

The joints of the brick surfaces and the masonry trim on both the old depot and the annex required a large amount of tuck pointing after they were cleaned. Before this was done loose mortar was raked out with special tools. The joints were then moistened with clean water applied by fiber brushes, so that the entire backup and edges of the masonry in contact with the mortar were dampened. The mortar used for tuck pointing consisted of one part Portland cement to 3½ parts sharp clean sand, with 10 to 15 per cent of thirty-day slacked lime, mixed in only such quantities as could be used before initial set took place. This was applied with special tuck pointing tools and struck smooth to the point that the moisture floated to an even surface. All edges and any excess of mortar were brushed with dusters. In this work, two men worked on each scaffold, and each scaffold was supplied by one ground man.

All windows were caulked with oakum after the cleaning operations, if the void between the masonry and the window jamb exceeded ⅜ in. in width and was more than ¾ in. deep. In such cases, the opening around the entire perimeter was caulked with marine-spun oakum which was packed and hammered back in position to within ½ in. of the finished surface. The entire perimeter was then primed with clear shellac, applied with paint brushes of the proper size, and the remainder of the void was filled with a gun grade of mastic cement applied under hand gun pressure. All surfaces were then hand tooled smooth.

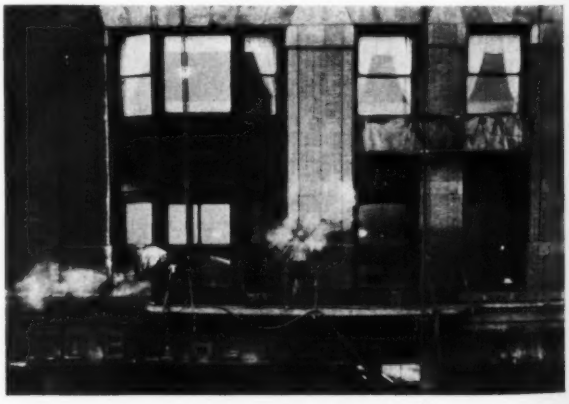
In addition to the cleaning work, approximately 2,000 ft. of abandoned water-piping and sprinklers located above the windows on the western exterior of the building were removed. This sprinkler system was originally intended for fire protection from business buildings that once adjoined the station on the west. To complete the exterior cleaning and improvements, three new clock faces of a special plate glass, with greatly improved visibility, were installed in the tower clock.

In addition, considerable interior decoration and renovation were done within the station. The high arched ceiling of the large waiting room was repainted in light ivory and tan shades to brighten up the room. The benches and settees were sanded and revarnished, aluminum handrailings were installed on the stairways, and a considerable amount of other cleaning and interior painting was done in the offices, along with the installation of new cabs and an annunciating system for three elevators.

Safety Measures

In addition to the use of rubber clothing when handling acid, and of masks and respirators in the sandblasting work, numerous other safety precautions were taken. All of the men employed in the cleaning work were veterans, some of them having had 18 years' experience in this particular type of work, and understood the safeguards necessary.

The scaffolds were specially made. They were 24 in. wide and 24 ft. long, with a back rail of ¾-in. pipe supported by three uprights. They were usually suspended by block and tackle from one of three types of supports; from 1½-in. rope slings over the edge of the roof, which were tied back properly to substantial and strategic points on the roof; from outriggers,



Acid-Steam Washing Was Very Effective in Removing the Heavily Caked Accumulation of Dirt

(Continued on page 544)

Great Care Should Be Exercised in Measuring Mid-Ordinates, Particularly at the Ends of the Curve, Where the Mid-Ordinates Are Small

A Weakness of String Lining and Its Correction

This article discusses an inherent difficulty in string lining work—namely, the problem of making the curve spiral truly tangent at the point of spiral, and explains the use of the tangent offset method of measuring mid-ordinates on the spirals

ONE of the principal reasons for the popularity of string lining is that it is a fast and accurate method of establishing uniform line on curves economically. In addition, this method has considerable flexibility, allowing a uniform curve to be established with a minimum amount of lining. This results in saving labor costs for the lining operations and also, if otherwise the curve would be lined considerably, in future maintenance required until the track becomes stabilized. Perhaps the most important advantage of the string line methods, however, is that they are reasonably simple, easy to understand and require no elaborate equipment. This permits the supervisors and in many cases the foremen to use this method to reline their curves much better than they could by eye.

Spirals Lengthened

In the last few years many railroads have relied to a great extent on string line methods for relining curves to keep them in smooth riding condition and in a number of instances string lining has been used when preparing curves for the operation of new high speed trains. These higher speeds have demanded that for smooth riding, the spirals on both ends of the existing curves must be lengthened to provide a comfortable run-off of elevation, and that a false tangent or a slight "gooseneck" or reverse at the end of the curve cannot be tolerated.

Although it is relatively easy to calculate the track throws necessary to produce a good spiral by the string line method, there is no absolute assurance that the resultant curve when lined will meet, and be tangent to, the true tangent of the track at the point of spiral after the curve is lined. There are several reasons for this. In the first place, the tangent track and the curved track near the end of a curve, unless recently lined, are seldom in perfect line and very frequently several rail lengths of false tangent (i.e. track that is straight but not tangent) may exist. In the second place, the small measurements at the end of a spiral may be inaccurate owing to irregular wear of the rail, a slightly kinked rail or a very slight reverse curve which would be measured as a zero mid-ordinate when actually the mid-ordinate was negative. In such cases when mid-ordinates of a curve are measured until a zero mid-ordinate is obtained, the curve, when lined, is not tangent to the tangent track at the point of spiral.

Many trackmen and supervisors realize this, and in their string lining work have learned by experience to diagnose carefully the conditions at the ends of a curve at the time the measurements are made and to make allowances in their computations. If their judgment is good, a very presentable spiral and tangent are obtained in the final lining. Others measure, compute and line the curve, and when the work is completed, if the spiral or the tangent track does not look right, re-line the end of the spiral by eye or reline the tangent for some distance from the existing curve, or possibly both. Still others line the tangent track and a portion of the spiral at the end of a curve by eye, improving the conditions at this point before taking their measurements. The latter method is probably the best of the three, but such methods either duplicate work or are makeshifts and in many cases the spiral is altered from the standard desired, or the swing in the tangent track is placed a greater distance from the curve to make it less apparent. It is, of course, true that the slight changes in line on straight track or in the end of the spiral near the point of spiral ordinarily have little adverse effect upon the riding qualities of trains of moderate speeds but such conditions are not considered desirable on high speed track.

Transit Used

In string lining curves for high speed trains, a number of railroads have recognized this weakness in string lining and have used the transit to insure proper line at the point of the spiral. A number of ways of doing this have been used. One method is to run in the entire spiral with a transit by one of the standard methods used in the regular transit lining of curves. Another method is to use the transit to measure the tangent offsets. Transit lining the spiral has the same disadvantages that apply to the transit method of lining the entire curve, namely, that it takes longer and re-

quires the services of a qualified transitman. The tangent offset method on the other hand is fast, the computations are simple and a supervisor or a foreman, if properly instructed, can use an ordinary lining transit to measure the tangent offsets.

Tangent Offset Measurements

When the tangent offset method is used, the mid-ordinates for string lining the curve are measured in the usual way, with the exception that the smaller mid-ordinates for several stations at the ends of both spirals need not be measured. The transit is then set up on tangent track far enough away from the curve to be on the true tangent. Usually the transit is set up over the gage side of the rail, using the rail that corresponds with the outside rail of the curve. If the tangent track is not in good line, the point at which the transit is set should be selected with care.

A tangent line is determined by sighting along the gage side of the rail and selecting an average line which is projected toward the curve. The tangent offsets (i.e. the distances from the tangent line to the gage side of the rail at each station) are measured at the marked stations, using the same stationing and the same units for measurements in which the mid-ordinates were measured. The tangent offset distances at each station are recorded as positive if the gage side of the rail is inside (toward the center of the curve) from the tangent line and negative if the gage side of the rail is outside of the tangent line. It is desirable that the measurements of the tangent offsets be taken at several stations for which the mid-ordinates were measured and also for several stations on tangent track beyond the probable point of spiral. If the tangent is in bad condition near the end of the curve, it is also advisable to measure the tangent offsets at one or two locations on straight track a considerable distance from the end of the curve so that stakes may be set at these points.

Tangent Offset Calculations

In the accompanying table sample measurements of mid-ordinates and tangent offsets are shown. Examining the measured tangent offsets shown in the table, it is seen that there is slight reverse curve in the tangent and that a mid-ordinate measured with a string at station seven would be zero. The track at this point (from station six to eight) is straight, yet is not tangent, but crosses the true tangent at a slight angle.

For purposes of computation, one may assume that the track has been lined to its true tangent from stations one to nine inclusive; this will change the tangent offsets for these stations to zero and leave the tangent offsets of the remaining stations unchanged. The next step is to compute the mid-ordinates for stations 8, 9 and 10 from the revised tangent offset figures. This is done by taking the average of the tangent offsets at the stations on each side and subtracting the tangent offset at that station. Using this method, the mid-ordinate for station 9 will be $\frac{0 + 4}{2} - 0 = 2$, for station 10 will be $\frac{0 + 16}{2} - 4 = 4$, and for station 11, $\frac{4 + 38}{2} - 16 = 5$, which checks the measured mid-ordinate. The same procedure is followed for the spiral at the other end of the curve and the entire curve is then figured, using the revised mid-ordinates at the ends. After the curve is figured, the tangent throws theoretically assumed to reduce the tangent offsets to zero (as described above from stations one to nine inclusive) *must* be added to the computed throw for each station at the ends of the curve. These tangent throws are equal to the tangent offsets and are in or out depending on whether the offset is minus or plus respectively. The computations are then complete and the curve when lined will be truly tangent at the point of spiral.

Tangent Offset Calculations

Station	Measured mid-ordinates	Measured tangent offsets	Revised tangent offsets after tangent throw	Revised mid-ordinates for computing purposes
1		0	0	0
2		0	0	0
3		1	0	0
4		1	0	0
5		2	0	0
6		1	0	0
7		0	0	0
8		–1	0	0
9		–1	0	2
10		4	4	4
11	5	16	16	5
12	6	38	38	6
13	15			15
14	16			16
15	20			20
16	21			21
17	20			20
18	23			23

In the use of the tangent offset method, judicious selection of the stations, which are assumed to be lined to tangent to simplify the revised tangent offsets, will also simplify the adjustments necessary in computing the curve and reducing to a minimum the maximum throw required to reline the entire curve.

Passenger Station Gets Its Face Washed

(Continued from page 542)

counterbalanced with weights (usually sandbags); or from hooks of a suitable size, which were designed to fit the parapet and coping and bind the hook when a downward pull was applied. When hooks were used, they were also tied back as a further precaution in case of any slippage. The block and tackle assemblies were equipped with ⅞-in. rope and were attached to bails at each end of the scaffold. In handling the scaffold, the men raised or lowered it together and then made a block and tackle hitch around the bail and hook of the block. All ropes used were given periodical inspection. As a further safety measure, when steam cleaning was employed above station sidewalks and doorways used by patrons, the work was done under floodlights at night during the period when the least number of trains arrived and departed.

During the course of the cleaning work, a number of surprises came to light, one of them being the discovery than an inner wall between the station and the office annex was faced with brilliant white enameled brick, evidently intended for a courtyard or light shaft. Various colors in the brick and stone work, which had been hidden by the coating of dirt and soot, were also discovered.

The startling transformation of the station from a dingy black to a clean, attractive structure, has been considered well worth while by the Illinois Central, and it is anticipated that the building will maintain its clean, attractive appearance for a considerable time, since the electrification of the terminal, and more recently, the growing use of Diesel locomotives for switching purposes, has eliminated a large portion of the smoke and soot from railroad operations that formerly existed.

The cleaning, caulking and tuck pointing on this station were done under contract by the Chris Paschen Corporation, Chicago. All of the work was done under the general supervision of Fred L. Thompson, vice-president in charge of engineering of the Illinois Central, and under the immediate supervision of R. H. Carter, division engineer, Chicago.

Backfilling a Large Bomb Crater—Somewhere in England

Bombed and Blasted—

British Railways Carry On

IN VIEW of the extent to which the interests of Americans are being devoted to activities concerned with National defense, the problems that are confronting maintenance of way forces in keeping open their lines in the bombed areas of Great Britain are of interest and value to railway men of similar responsibilities in this country. For this reason, special interest attaches to booklets issued by the British Railway and received in Washington by the Association of American Railroads. According to those booklets, in spite of the thousands of bombs that have fallen on British railway tracks during the last year, trains continue to operate with little interruption, even during air raids, and damage to the tracks is usually repaired within three or four hours. Rarely does damage to a line or station require more than 12 hours to repair sufficiently to have trains again operating.

In the foreword of one of these bulletins, Lt. Col. J. T. C. Moore-Brabazon, Minister of Transport, says:

"Railways form the biggest part of our war machine of transportation. There are two features in connection with the railways which give special cause for pride and confidence. One is the astonishing powers of recovery possessed by the railways; the other is the cool courage of all grades of workers."

Commenting on the information contained in the bulletins, the A.A.R. says in a release, in part, as follows:

At the beginning of intensive air attacks on Britain, the British railroads restricted the speed of trains to 15 m.p.h. during air raid "alerts." When experience showed that this was unnecessary as a safety precaution, speeds were raised to 25 m.p.h. during daylight raids and 15 m.p.h. during night raids. Further experience has resulted in raising the speed limits to 50 m.p.h. during daylight and 30 m.p.h. during blackout "alerts."

How the railroads deal with air raids, however, is but one of the interesting aspects of war-time railroading in Britain described in the booklets. The necessity of complete blackouts of yards and terminals at night has concentrated the business of loading and unloading freight into the daylight hours. To get the utmost service out of their "wagons" (freight cars), this work goes on through all daylight hours with "no Sundays off for railway wagons now."

Blacked-out terminals add greatly to the difficulty of switching operations, or "shunting," as the British call it, but much experimental work has been done to screen from air view the electric signal lights, the glare from locomotive fire boxes and the ground flares used in the yards by "fogmen." Systems of reduced lighting that can be put in operation at a moment's notice by one master switch have been installed in many yards, as well as within the nearly 7,000 passenger stations in Britain.

Emergency wartime lighting which does not show outside the "carriage" (passenger car) windows has been installed in 46,000 passenger vehicles, also. All trains run "dark" during air raid alerts, except that in dining cars the lights continue to burn dimly under the control of a trained employee at a master switch. Wayside signal lights continue to burn also, but they are hooded effectively so that they are practically invisible to enemy aircraft at the heights they normally fly.

Special Wrecking Trains

Wrecking trains, stocked with track materials, steel girders, timbers, signal wires and other supplies are held in readiness, with steam up. Special fire-and-bomb cars developed by the British railroads to fight incendiary fires and deal with unexploded bombs are spotted at strategic points also. Such cars carry portable fire pumps, which can be skidded from the cars and moved to the fire; shovels to bury incendiary bombs with sand and earth; snuffers to smother incipient fires; and tongs for handling unexploded or delayed action time bombs.

After a Few Strenuous Hours, the Roadway and Tracks Were Normal Again

To replace some of the more than 50,000 railroad men who have gone into the armed forces, the British railroads have employed more than 10,000 women and are seeking others. Since the new railway-women handle express or "parcels" traffic, among the other duties which they perform, the railroads are urging the public to reduce the size and weight of parcels within the limits which can be handled by women workers.

In spite of these and other difficulties of operation, not the least of which is the impossibility of planning major transportation movements in advance, the railroads continue to handle the traffic. Schedules may have to be broken up and trains re-routed at any time because of bomb damage, or to make way for "Q traffics," which is the name given by the British to expedited special trains carrying commodities or persons of paramount importance at the government's order. More than 50,000 such special trains have been run since the beginning of the war. Special long-distance coal trains, over and above the normal daily movement, have numbered as many as 1,000 a month.

The heaviest concentrated movement of persons during the war thus far was in connection with the evacuation of Dunkirk, when 300,000 troops were handled from seven ports in the southeast of England, without previous notice or advance preparation, within a space of eight days. As many as 100 special trains were run in a day in handling this mass passenger movement. During the period of the evacuation the railroads continued their regular services to the country as well.

Speed and Courage in Work

Among the examples given as typical of the powers of recovery of the railways is the case of a bomb explosion on a double track just above the subway for passengers at a busy station. Rails, timbers, girders and platforms were blasted, and signal cables were blown out. Two wrecking and supply trains were rushed to the blasted station, along with gangs of men. Both tracks were reopened, the signal lines were restored, and the station was again in service within less than eight hours.

Among the typical examples of courage under fire are stories of switching crews who moved train loads of blazing ammunition to points of safety, or unloaded high explosives from cars already on fire; of men who continued work on emergency wire repairs directly over an unexploded bomb, and then helped the bomb disposal squad remove it to a near-by river; and of others driving bombed and machine-gunned trains, or working signal levers amid falling bombs, in signal towers that were already on fire.

Summing up in one of these bulletins, the Minister of Transport says: "Bombed and machine-gunned, slowed up by storms of almost unparalleled severity and slowed down by unavoidable lighting restrictions, the railways have performed feats of engineering and operational skill in order to insure that the nation's war effort is not held up."

New Method of Attack On Water-Tank Corrosion

Abstract of a report presented at the American Railway Engineering Association convention last March, which describes the cathodic method of preventing deterioration of the interior surface of steel tanks.

IN THE last few years various methods have been tried by American railroads to reduce the deterioration of steel water tanks due to corrosive action. Many methods of preventing corrosion have been found efficient in their application to the exterior surfaces, but they are not proving entirely satisfactory when applied to the interior surfaces of tank shells, which are subjected to the corrosive action of water.

Approximately 6,000 steel water tanks, representing a capital investment of $30,000,000, are now in railroad service. Their expected life should be about 60 years. However, this is being reduced materially by the loss of steel occurring as a result of under-water corrosion. Based on actual tests, the coating of the interior surfaces of steel tanks with paints of various types affords protection for a period ranging from one to four years. The labor cost involved in scraping and cleaning the interiors of steel tanks averages 2.4 cents per square foot, the cost of applying the paint is 1.9 cents per square foot, and the cost of the painting material for two coats is 0.7 cents, bringing the total cost to 5 cents per square foot. At this rate, the cost of painting the interior of a 50,000-gal. steel tank is approximately $95, while the cost of painting a tank 40 ft. in diameter and 74 ft. high is $790. Consideration must also be given to the fact that tanks must be removed from service for 4 to 15 days to permit their interiors to be painted.

Underwater corrosion, as it is encountered on the interior surfaces of steel water tanks, is explained by the generally-accepted electro-chemical theory that the metal dissolves and goes into solution by first forming ferrous hydroxide, and, with further oxidation from dissolved oxygen in the water, builds up a wall of iron rust around the pitted area. In this reaction the shell of the steel tank is the anode or positive pole and the rust is the cathode or negative pole, as

Indications Are That Benefits Are Being Obtained Through Cathodic Protection

* Presented by a subcommittee of the Committee on Water Service, Fire Protection and Sanitation, of which H. E. Silcox, assistant engineer of water supply, Chesapeake & Ohio, was chairman.

illustrated in the accompanying drawing. The fundamental reactions and factors of corrosion are similar to those of a primary electric cell, in which one metal or electrode dissolves and goes into solution.

Of Recent Development

Cathodic protection is a recent development in the control of corrosion on the interiors of steel water tanks. This process is based on the principle of an electric cell in which the current flows in one direction from the positive electrode through the water in the tank, which acts as an electrolyte, to the cathode or negative electrode. In its operation, the steel tank shell becomes the cathode on which is deposited a protective film of hydrogen. The cathodic method of protecting steel water tanks has the advantage that it is not necessary to remove water tanks from service to permit application of the protective coating, as would be required in the cleaning and painting operation.

In the application of this method of protecting steel tanks, direct electric current is required to provide a continuous flow of current. As direct current is not always available, the supply is usually secured from the regular 105-120-volt, 60-cycle, alternating-current lighting circuit by introducing a transformer to reduce the voltage as required and then by passing it through a dry-disc rectifier unit which changes the power to direct current. From the rectifier the positive wire or lead is connected to one or more electrodes of carbon, graphite, stainless steel or other metals, which are suspended inside the tank at such a depth that they will be submerged in water at all times. These electrodes form the anodes (positive pole). The negative wire of the rectifier is connected to the bottom of the tank shell which becomes the cathode.

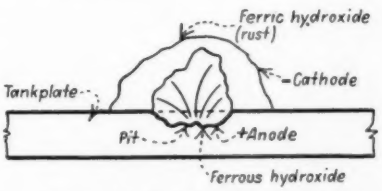
In operation, the current flows through the water from the anode to the cathode, dissociating hydrogen ions by electrolysis of the water. Owing to the fact that the tank shell is in an electro-negative state, the positive hydrogen ions are attracted to the metal, being deposited in the form of an insulating film on the shell interior below the water line, thus excluding oxygen which is a requisite of corrosion.

Equipment Required

The cathodic unit, consisting of the transformer, rectifier, switches, voltmeter, and fuses, is assembled in a steel cabinet with a hinged door for protection. When designed for installation at tanks where shelter is not available, the cabinet should be of a moisture-proof type. In the event that a location inside a building is available, an ordinary steel cabinet is adequate.

The number and size of the electrodes required will depend on the square feet of area under water to be protected and the pH value (hydrogen-ion concentration) of the water in storage. The materials that are most commonly used for the electrodes (anodes) are graphite and stainless steel. Graphite anodes that are now in service range from 2 in. to 3 in. in diameter and are 80 in. in length, while the stainless steel units range from ⅜ in. to 1 in. in diameter and are of varying lengths. In operation, the direct-current voltage at the positive electrode ranges from 8 to 27 and the amperage from 0.5 to 6, depending on the condition of the tank and the resistance of the water to the passage of current.

For converting alternating current to direct current for use in the cathodic process, three types of dry-plate rectifiers are available, namely, magnesium-copper sulphide, selenium and copper oxide. The safe maximum operating temperature of these units ranges from 55 deg. C. (131 deg. F.) to 85 deg. C. (185 deg. F.) Owing to the limited period in which rectifiers have been in service in this application, it still remains to be determined which type has the longer life, measured in hours of service.



Formation of Rust Cones and Pits

Through observation of tank interiors that have been provided with cathodic protection, it has been found that the old scale and rust gradually slough off, the metal becoming coated with a gray deposit, although the protection afforded is due to the microscopic hydrogen film instead of this deposit. As a means of checking the operation of the unit without draining the tank, test specimens are often hung in the water, one being connected to the tank shell by means of wire, which affords it the same protection as the tank, and the other by a cord or rope. The wire-connected specimen in time becomes covered with the characteristic gray coating, indicating that action is taking place. The second specimen in a short time becomes coated with rust, and pitting develops. This method is being used by the manufacturers to demonstrate the results obtained.

At the present time about 25 installations of cathodic protection units are in service on American railroads, the oldest unit having been installed in March, 1939. The cost of the units installed depends on the area to be protected. For installation in a 50,000-gal. elevated steel tank with an inside area of approximately 1,800 sq. ft., a unit having one or two electrodes will cost approximately $250, plus the expense of running power to the tank. Units for larger installations, such as would be required by a standpipe-type treating tank, 40 ft. in. diameter by 53 ft. high with a downtake tube, containing 13,600 sq. ft. of surface to be protected, would require five electrodes and would cost approximately $475. The cost of power for operating cathodic protection unit ranges from 50 cents per month up, depending on the capacity required.

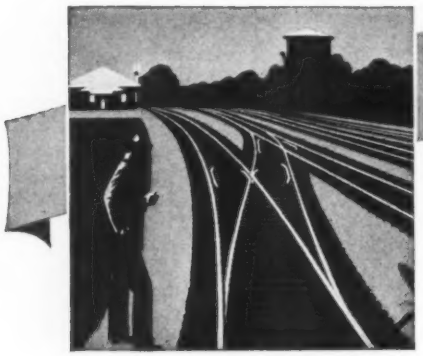
Even though a tank has been equipped with a cathodic protective system, it is still necessary to paint the underside of the roof and the tank shell above the water line, as the protection does not extend to the surface area of the tank above the water level. In the event that installations are contemplated in old steel tanks that are badly corroded and pitted, the condition of the plates and rivets should first be investigated, as the cathodic protective system, through removal of the scale, may cause leaks and the loss of rivets. When contemplating installations in cold regions, consideration should also be given to the possibility that ice forming in the tops of tanks might strip the cables and electrodes from their supports.

Periodic inspections should be carried out to determine whether the equipment is functioning, to record voltage and amperage readings, and to test switches for the purpose of detecting defective or blown fuses. The interior of the tank shell should also be inspected to observe the extent of the deposit of protective film, with the object of maintaining the correct voltage adjustment to meet the requirements of the installation.

Conclusions

Cathodic protection of steel water tanks against the corrosive action of water is still in the experimental stages; however, the indications are that some benefits are being obtained.

Because of the limited period in which this method has been in operation in railroad water service, more time will be required to demonstrate whether cathodic protection is satisfactory as a means of preventing corrosion in steel water tanks.



WHAT'S the Answer?

Training Systems for Foremen

What are the advantages and disadvantages of track-apprentice or student-foreman training systems? What qualifications should be given weight in selecting candidates?

Changes are Revolutionary

By C. H. R. Howe
Cost Engineer, Chesapeake & Ohio, Richmond. Va.

Revolutionary changes in track-maintenance methods during the last 20 years have brought about a revision of ideas regarding the character of the preparation that the track foreman, and others in charge of work, must receive. In many cases the introduction of roadway machines and power tools has removed the heavier type of jobs, such as laying rail and surfacing out of face, from the sections and this work is now being done by large specialized extra gangs. The general problem has, therefore, become one of training foremen so that they will be capable of handling major extra gangs and of instructing section foremen in standardized methods of performing their work.

The first essential in carrying out any such plan is the selection and development of supervisory officers who are capable of instructing their subordinates intelligently in the requirements of their tasks. Fortunately, the broadening of the field of educational opportunity, and the widespread use of the automobile and other machines provides us with a younger generation that adapts itself readily to innovations, and enlarges the field of candidates from which we may select.

There is little question as to the great advantage to be derived from an apprentice training for foremen or, for that matter, for any supervisory position, if it is not overdone. Too much stress should not be placed on technical or other advanced educational qualifications, for they do not imply the possession of executive ability. The average railway is a democratic institution, containing numerous strata of official rank, with the number of positions diminishing rapidly as the rank increases. If all who enter railway service were of equal ability, the result would be stagnation and numerous disgruntled employees; or they might seek other employment, causing a loss to the railway of the investment that has been made in training them.

Several years ago, our railway recognized the necessity for establishing a training system for those who were to be its future maintenance and transportation officers. It was recognized that these men would come from the ranks of our young engineers, section men or clerical forces, depending on the individual's ability. The problem then was to determine what method would serve best to prepare them for future responsibility.

It was concluded that a system of training that would give them a common basic knowledge of relative values of various track-work operations, would serve best to secure uniformity of purpose in handling work. It was concluded further that the placing of these men immediately under the direction of experienced supervisory officers would be beneficial to both. The trainee would have the opportunity of learning the methods of management employed by his superior officer who, in turn, would receive valuable work-performance information previously not available.

This system was put into effect and has continued in operation ever since. During the last 16 years, 33 men have

Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

To Be Answered in October

1. *When constructing a wood crossing, is it desirable to provide an air space below the planks? Why? How can this be done?*

2. *How frequently should a turntable be inspected? By whom? How should the inspection be made? What details should be observed?*

3. *What are the relative merits of long and short guard rails opposite frogs on tangent running tracks? On curves? On the turnout side?*

4. *What details should be given particular attention when inspecting a ballast-deck trestle? When should the inspection be made? Who should make it?*

5. *What is the maximum lift that can be tamped effectively with power tamping tools? The minimum lift? Does the kind of ballast make any difference?*

6. *What are the relative advantages and disadvantages of centrifugal and displacement pumps? Does the service in which they are used make any difference?*

7. *What are the causes of rail creepage? Is it more pronounced on single or double track? Why?*

8. *How should the capacity of a septic tank be determined? Does this differ for stations, shops, offices and company dwellings? If so, in what way?*

had the benefit of this training and have advanced to higher positions, 10 as maintenance officers, 10 as track supervisors and 13 in the transportation department. In addition, 18 men are now in training under this system.

Should Be Interested

By JOHN D. HENLEY
Track Supervisor, Southern, Richmond, Va.

There are many advantages in a system of training men for track foremen, and few, if any disadvantages. The training of men to replace section foremen as the need arises is a very important part of the roadway officer's work. Great emphasis is being placed on the use of new equipment and better materials in track maintenance, and no less emphasis should be placed on the securing and training of men to use this equipment and these materials.

Prospective apprentice foremen should have at least a high school education. They should be in good health and have a preference for outdoor work. They should be interested in maintenance work; they should be self-reliant and have confidence in themselves; because occasions will often arise when they must rely on their own judgment and initiative.

It is almost essential to have some system of apprenticeship or student-foreman training to secure and hold the kind of men that are needed for track foremen. Some inducement more than an ordinary track laborer's job should be offered to attract new men and to encourage ambitious men already in the service. There are many good men available who have all of the necessary qualifications except experience, and while they would accept a foreman's job gladly, they cannot be secured or held unless they are given some extra inducement during the training period.

After the apprentice foreman has been selected, he should be given special attention by the foreman and the supervisor. To insure that his experience will be comprehensive, he should be moved from one force to another where different kinds of work are being done. He should become familiar with yard maintenance, laying rail, general surfacing and all other phases of a track foreman's work. If unusual conditions, such as a wreck or high water, should arise, the supervisor should take the apprentice foreman with him to assist at the scene of the trouble, so that he will become familiar with the requirements of such occurrences. In addition to the work to be done in the field, the apprentice foreman should be taught how material and labor are properly charged out in the foreman's time book, and he should also be made familiar with the reports that are required of section foremen.

Materials for Bridge Piers

What are the relative advantages of bridge piers constructed of metal bearing piles, metal sheet piling and piers of concrete masonry?

Depends on Conditions

By JOHN F. MARSH
Chief Draftsman, Chicago, Rock Island & Pacific, Chicago

Pile piers constructed of steel bearing piles are used extensively because of their economy, compared with other types of bridge foundations. They may be constructed without the use of expensive cofferdams or caissons, and are exceptionally useful on secondary lines where the cost is an important consideration, and on main lines where a line change is contemplated at some future date.

Steel-pile piers are also economical where short spans are desirable, as the substructure cost will not be out of proportion with that of the superstructure. However, they should be used where a hard substratum is found at a reasonable depth, to develop sufficient point bearing to support the loads imposed upon them. Under such conditions, they work out quite satisfactorily, even where the upper strata are subject to scour.

Piers made of steel sheet piling form their own cofferdams and are economical in that respect. They are advantageous where hard substrata are found at great depths below the surface, and the loads can be carried safely by the development of skin friction on the surface of the piers as well as by end bearing. Under these circumstances it is not necessary to go down to the hard substratum to develop sufficient stability.

Piers of concrete masonry are generally higher in first cost than those of the foregoing types, but when constructed properly, they will give many years service, which tends to offset the greater initial cost. It is economical in many instances to carry the footings 8 to 10 ft. below stream bed and place the piers on steel bearing piles driven to rock or shale. Owing to their mass, concrete piers will absorb the vibration from trains and thus make for better riding conditions over the structure, which is to be desired, particularly in main-line service. Also, owing to this stability, longer spans can be supported on concrete piers safely and economically.

Streamlining both the upstream and downstream faces of piers will prevent eddying and resultant scouring around the downstream face of the pier. It will thus allow the water to pass through the bridge at a faster rate of flow than if this is not done.

Must Not Wash Out

By G. S. CRITES
Division Engineer, Baltimore & Ohio, Punxsutawney, Pa.

Obviously, the load at the bottom of the pier is the weight of the pier itself and its loading. This loading is made up of the weight of the superstructure and the passing traffic that is supported. Piers are also subject to other forces, including thrusts from starting and stopping traffic, wind and stream pressure, impacts from ice and other floating materials and in some sections, earthquake shocks. The most advantageous pier is the one that best takes care of the loading and other forces and will not wash out. More piers have failed from scour than from structural failures.

Concrete piers are evolutions from earlier types of log or stone piers, or combinations of logs and stones, made possible by cement and metal reinforcement. If founded properly on unyielding and unwashable materials, such piers are secure. However, they take up room in channels and their mass may create hazards to navigation or may obstruct stream flow unduly or change the direction of flow.

Steel bearing-pile piers can be designed accurately for loading, thrusts and shocks. They can be founded satisfactorily if good foundation material is within reach and by using corrosion-resisting metals electrically-welded, a properly designed pier of minimum dimensions can be built. Restrictions of channel are held to the minimum and danger from scour and ice thrust is reduced. In April, 1906, a concrete masonry pier in the channel of the Salinas river in California was sheared off at its base by earthquake shock. This would not

have happened to a steel-pile pier.

Steel sheet-piling piers can be designed to take care of loadings in a reasonably satisfactory manner, but they take up more channel space than metal bearing-pile piers and are objectionable from that point of view. Also, there is less certainty that they are founded securely, and they cannot be subjected to model tests in laboratories, as can be done with steel bearing piles and other types.

Mechanized Rail Gangs

How many men are required in a full mechanized rail gang? How should they be organized? How many units of equipment should be provided?

Uses 105 Men

By C. W. Baldridge
Assistant Engineer, Atchison, Topeka & Santa Fe, Chicago

A track-laying gang should be preceded by a foreman and four men, with a push car, to distribute the joint bars, tie plates, anti-creepers, bolts, spring washers, spikes and tie plugs, as closely to the points of use as practicable. Uusually this unit is a half day or more ahead of the rail gang.

Obviously, the first requirement in laying rail is to have a flagman out in each direction, if on single track and on double track if traffic is not diverted. The power wrench should lead the gang. Tabulating the movements in order, giving the functions of each unit, the power machines required and the number of men necessary to perform the various operations and carry them forward at such a rate that all units will progress uniformly, the number of men assigned for each operation should be as follows:

Flagging, 2; distributing material, 6; unbolting old rail, 2; pulling spikes, 6; removing old joints, 3; throwing out old rail, 3; removing tie plates, 2; removing spike stubs, 2; setting tie plugs, 3; driving tie plugs, 4; sweeping ties, 3; adzing ties, 4; servicing adzing machine, 3; creosote carrier and heater, 3; applying creosote, 4; placing tie plates, 3; setting in rails, 3; straightening tie plates, 2; oiling rail ends and joints, 1; placing joints and bolts, 2; bolting joints, 2; gage spiking, 9; starting spikes, 5; machine spiking, 9; applying anti-creepers, 2; clean-up and emergency gang, 6; bonding joints, 4; water boys, 2; and supervision and timekeepers, 5. This totals 105 men.

The work equipment will consist of 1 power track wrench to strip bolts, 2 spike pullers, 3 adzers, 1 bit grinder, 1 stove for heating creosote, 1 rail crane, 1 bolt tightener, 1 air compressor, 4 spike drivers, 2 bonding drills, and 1 rail drill. Failure of an important machine may result in considerable loss by stopping or slowing down the work. It is advisable, therefore, to have spare machines on hand or within easy reach as follows: 1 bolt tightener, 1 spike puller and 1 adzer. An additional rail crane can be useful in many of the tasks incidental to laying rail, and thus be kept in the vicinity of the gang and can replace the one on the job in case of need.

While the gang outlined is typical, men will be shifted from one unit to another as difficulties arise which slow down one or more of the operations, or conditions combine to accelerate others. A rail gang is thus a constantly changing organization.

Several Factors Involved

By C. E. Miller
Assistant Engineer Maintenance, Chicago & North Western, Chicago

This question involves several factors, each of which should be studied with relation to the particular job to be done. The magnitude of the rail program will, of course, influence the size of the gang to be organized. In some locations the rail must be laid under heavy traffic, and the importance of not interfering with trains may be inconsistent with the most economical rail-laying operation; that is, the size of the gang should be varied according to the length of time the track is available, with non-interference with traffic taking precedence over the utmost economy in the laying of the rail.

Again, considerable switch and crossing work may be involved, and if this is to be handled by the regular rail-laying organization, a large gang should not be employed because of the loss of man-hours incident to delays. The type of track fastenings and of the track structure, in general, may also influence the size of the gang for the most economical results in laying the rail.

For the foregoing reasons, no standard can be set for the size of the gang that will give maximum economy under all conditions, and it is assumed that a gang should be organized and fully mechanized for laying a considerable mileage of rail in continuous stretches, where the track can be taken out of service during the working hours. Under such circumstances, it is my experience that a gang of about 135 men, laying from 1½ to 1¾ track miles a day, closely meets the requirements of economy.

By studying the capacities of the various units of rail-laying machinery, such a gang has been set up as approximating the proper size most economically to utilize the machine capacity under average conditions. While, of necessity, there will be some changes in the details of the organization, depending on whether the old bolts are to be scrapped or salvaged, the amount of ballast to be dug out to clear the adzing machine cutters, the type of anti-creepers to be applied, and other items of similar nature, the following is about a typical organization:

One general foreman, 2 foremen, 3 assistant foremen, 1 timekeeper, 1 mechanic, 1 toolman, 2 water-boys, 3 men turning the rail workwise, oiling the fishing area and hanging joint bars, 1 man removing anti-creepers, 1 man cutting bond wires, 3 men distributing tie plates from a push car, 1 welder with push car cutting old bolts, if they are not to be salvaged, 1 welder's helper, 3 men to knock out old bolts and joint bars, 4 spike-puller opertaors with 2 machines, 2 men pulling throat-cut spikes with claw bars, 2 men lining out old rail, 4 men removing tie plates and piling scrap, 2 men driving down spike stubs, 1 man distributing tie plugs, 3 men setting tie plugs, 3 men driving tie plugs, 4 men clearing high ballast from the ties, 1 man sweeping the tops of the ties, 6 adzing-machine operators with 3 tie adzers, 3 men with push car applying preservative to the adzed surfaces, 3 men placing tie plates, 1 rail crane operator, 1 tong man, 2 men guiding rail to position, 1 man placing expansion shims, 3 men distributing spikes, bolts and spring washers from a push car, 1 man with push car grinding adzer bits, 1 man setting bits in adzer heads and carrying heads to machines, 4 men placing joint bars and starting nuts, 4 power wrench operators with 2 machines, 12 gagers in sets of 3 each, 2 men straightening tie plates, 1 air-compressor operator, 8 spike setters, 4 spike driver operators, 2 tie nippers, 4 men driving joint spikes and redriving bad spikes, 2

men with push car distributing anti-creepers, 6 men applying anti-creepers, 6 men picking up and piling scrap and 8 men tamping loose ties.

The units of equipment required for such a gang should be about as follows: one rail crane, 3 adzing machines, 2 spike pullers, 2 power wrenches, 1 bit grinder, 1 power rail drill, 1 power rail saw, 1 air compressor with 4 spike drivers, 1 heavy-duty motor car, seven 24-men trailers, and 6 push cars. To avoid delays from break downs, it is well to have a spare unit readily available where this is practicable. I particularly recommend a spare bit grinder and a spare power wrench.

Surfacing Without Slow Orders

Can surfacing out of face be performed safely without slow orders? If so, under what circumstances and how high a lift? If not, what is the maximum speed recommended? Is flag protection necessary?

Depends on Lift

By J. B. Martin
General Inspector of Track, New York Central, Cleveland, Ohio

It has been my experience that surfacing out of face can be done without slow orders or flag protection if the lift does not exceed 2 in., and if heavy tie renewals are not being made in connection with the lift. In fact, many miles of track are raised annually under such conditions with no need for either slow orders or flag protection. However, the tamping must be kept up with the raise, so that when it becomes necessary to get ready for a train, it will be necessary to tamp only the runoff.

On the other hand, if the lift exceeds 2 in., or if heavy tie renewals are required in connection with the surfacing, or if other conditions arise that require speed restrictions, slow orders or flag protection should be provided in all of these cases.

Speed Restriction Needed

By George M. O'Rourke
Assistant Engineer Maintenance of Way, Illinois Central, Chicago

As a practical matter, surfacing out of face cannot be performed safely without speed restrictions. Under ideal conditions, where the track is being raised not more than 1½ to 2 in., and tie renewals do not exceed two or three to the rail; where tangents are long and trains can be seen a considerable distance; where ballast is unloaded close behind the surfacing in sufficient quantity and there is enough labor to keep the track filled, and thus prevent buckling or kicking out of line, some of our division engineers believe the work can be carried out safely without slow orders or yellow roadway speed-reduction signs.

Usually, speed-reduction signs must be used because of curves, higher raises, heavy tie renewals that generally accompany out-of-face surfacing and open track behind the surfacing gang, which awaits the new ballast. Again, the track is often open ahead of the gang, because the old foul ballast is being dug out and spread on the shoulders of the embankment.

All gangs engaged in surfacing on the Illinois Central are provided with caution signals that call for 20 m.p.h. This sign is made of 22-gage steel in the form of a disc 16 in. in diameter, with 7-in. figures. The figures, 20, are painted black on a yellow background. It has a handle that makes it convenient for the foreman to hold it so that enginemen can see it and pass over the work at 20 m.p.h., instead of the 10 m.p.h. allowed by the yellow roadway speed reduction sign, unless restricted by train order.

On that part of a railway where rail of 112 lb. or heavier is in the track, on slag, stone or chatts ballast, it might be considered safe to allow the yellow roadway speed-reduction sign to indicate a permissible speed of 20 instead of 10 m.p.h., because in most instances the 20-mile disc is shown unless the ties are found to be in very poor condition when the track is stripped, or other unforseen situations arise that create a hazard, it is not necessary to send out a flag to stop trains to warn the crews that out-of-face surfacing is going on ahead.

Automatic Control of Pumping

Under what conditions is it desirable to install automatic control of pumping? Is this type of control feasible with internal combustion engines?

At Almost Every Plant

By E. M. Grime
Engineer of Water Service, Northern Pacific

Automatic control is desirable at practicaly every pumping plant where there are no special conditions, such as water-treating plants that require the addition of chemicals by hand, where two or more pumps alternate in operation or where the equipment is so extensive and important in character that personal attendance is obviously necessary. Even though temporarily most roads are now enjoying a fair volume of business, good business judgment dictates that the utmost effort be made to attain maximum efficiency in every branch of operation, and to arrange a pumping plant in such a way as to require the minimum of manual labor is always desirable.

There are still in service a large number of old as well as fairly modern types of internal-combustion engines, cumbersome in design, driving equally clumsily-designed pumps which, at no reasonable expense can be changed over into automatic operation. The best that can be done in these cases is to modernize these plants completely, making them automatic so far as possible.

There are various designs of small power units of the internal-combustion type now in common use, which can be started automatically by the flow of water in a pipe line or the lighting of an electric lamp at some distant point; and the operation can likewise be stopped easily. There is no reason why the same principle cannot be applied to larger units. Where electricity is not available or is not being created by the unit itself, an internal combustion engine can be started manually, but provided with only enough fuel to complete the work to be done, such as filling a storage tank. The engine will then stop automatically when the fuel supply is exhausted. This is a type of semi-automatic operation.

Automatic or semi-automatic equipment has many applications in railway water supply work that may show worth-while savings. As an ex-

ample, a certain pumping plant on a branch line was complained about for years because it did not furnish sufficient water, and an additional station adjacent to it was maintained in service as an auxiliary. Measurements of the inflow into the surface well showed that there was a reasonably good flow tributary to the lower three feet of the well, but that the water would not rise normally to maintain more than a depth of 10 ft. in the well, thus making only a few thousand gallons of water available. The steam pump that had been provided originally pumped this water out in about two hours, and the custom was to wait another day until the well refilled before the steam pump could be used. As a consequence the demand for water was never satisfied fully.

Later, when electricity became available at this point, a small electric pumping unit was installed to draw the water from the bottom of the well at approximately the rate of inflow. Working by automatic regulation 24 hours a day, if necessary, stopping when the tank was full and starting when the water level in the tank dropped 2 ft. or more, the tank was kept practically full at all times, complaints about water shortage were eliminated and the auxiliary station was abandoned.

Favors Automatic Control

By Supervisor of Water Service

I am definitely in favor of automatic control of pumping wherever this is feasible, that is, where electric power is available and where constant attendance is not required for reasons other than pumping. Obviously, where electric current is not available, automatic control is not feasible. There are places where the pumps are installed in power houses at shops, and are looked after by the power-plant engineer, in which case automatic control may not be necessary, although I recall having seen such a station equipped with automatic control.

I also recall a pumping station where the water consumption was about 500,000 gal. a day, and where the water carried a high content of scale-forming and other solids. An earlier plant under manual control had been completely modernized and made entirely automatic, including both the pumping and the proportioning of the chemicals. Because of the necessity for preparing the chemical solutions, the desirability of keeping the plant clean and of having a daily inspection of the equipment, as well as of making daily trial tests of the water and keeping records, one man was employed on an 8-hour shift. This compared with one two-men shift and two one-man shifts in the former plant.

I mention this because when one thinks of automatic control of pumping, he usually visualizes a plant of small or moderate size. Automatic control of pumping is adapted for large as well as small plants, however, and for those of intermediate capacities, while the pumps may be near to or distant from the point of delivery. In fact, the savings that can be realized from automatc control of pumping are usually greater in the larger plants than in the smaller ones.

I have been told that equipment is available for the automatic control of internal combustion engines employed for pumping, and that it has been used to some extent. I have never seen such a plant or the equipment for this type of control, neither have I seen a description of a plant of this character. We have enough pumping plants that need modernizing, and as rapidly as funds are available we are working to this end. So far, however, electric power has been available at the plants we have rebuilt and we have confined our installations to electric-driven pumps and electric control of the pumping.

Treated Timber in Enginehouses

Is creosoted material suitable for use in enginehouses? If not, why? If so, to what extent? What are the advantages?

Adds Something to Cost

By L. L. Tallyn
Division Engineer, Delaware, Lackawanna & Western, Scranton, Pa.

There is no particular advantage in using creasoted material for the major portion of a wooden enginehouse; besides it adds to the cost. Creosoted material is not pleasant to handle, and the framing of the timbers will destroy the efficacy of the treatment where it is necessary to cut or frame it. Of course, this damage to the treated material can be avoided by preframing, but this is inconvenient and in practice this framing requires adjustment on the ground. Another disadvantage of creosoted material in this application is that it constitutes a fire hazard. There is a case of record where a torch was set at the foot of a creosoted post and started what might have been a destructive fire.

There are three elements of the enginehouse which it is advisable to treat. These are the roof sheathing, the front posts and the ties or blocking which carry the tracks on the engine pits. With respect to roof sheathing, if this is not treated, oftentimes the roof covering develops leaks, which rots the untreated sheathing; and when the roofing is renewed, it is often necessary to remove the sheathing as well. If it were treated, this would not be necessary. It is advisable to saw the blocks or ties used on the engine pit to proper length before they are treated, rather than to saw them after treatment.

Favors Creosoted Material

By General Inspector of Buildings

My experience indicates that creosoted material is well adapted for use in enginehouses, and that there is no reason why all wood parts, with the possible exception of doors, cannot be of creosoted material. From my point of view it is a sheer waste of money to use untreated wood in any part of an enginehouse, with the exception already noted. Moisture and temperature conditions in enginehouses are ideal for the propagation and growth of decay-producing organisms that attack and destroy wood. Added to this, the sulphur content of the atmosphere in and about an enginehouse tends to attack the timbers, breaking down the fibres and thus accelerating the destruction of the wood.

I have renewed a number of enginehouses, extended others to accommodate larger locomotives and have constructed several new ones. In the old buildings of this type, it has been astonishing to observe the advanced stages of decay one finds in some of the timbers, and the wonder is that some of them did not fail long before they were removed. Roof members,

including rafters, purlins and sheathing, seem particularly susceptible to decay if they are not treated. While posts last considerably longer, possibly because of their larger section and the fact that many of the posts in the older houses were clear heartwood, even they have been found to be in advanced stages of decay when removed, although almost invariably they retained their shape with little or no reduction in section.

About 25 years ago, in constructing an extension to an enginehouse, it was decided to use creosoted material. At that time no one thought of preframing the members, and when they were cut, we merely swabbed the surface thus exposed with hot creosote. Despite this somewhat crude method, this roof is still in service, although a few of the sheathing boards have been removed, having shown evidence of decay where the ends were cut and the hot creosote was not applied properly.

Two or three years later we built two new enginehouses; and while we had not yet gone to preframing, we did cut posts, beams, rafters and purlins to length before they went into the retorts, and none of the members in these structures have been replaced because of decay. Still later some one suggested the possibilities of using creosoted sash, and we tried this. Our first attempt was not a complete success, for we treated the wood and then tried to frame the sash. It should be noted that this scheme is not feasible. Next we treated a few sash that had been assembled but, while this was not a complete failure, it was not satisfactory. Finally we framed and fitted the sash and then took it apart and treated it in this way, assembling the parts after they had been allowed to dry out. This method was a complete success. It should be remarked in passing that it is not practical to use putty for holding glass in creosoted sash; this must be done by means of nailer strips, for which reason the muntins must be heavier than is usual in untreated sash.

Today we are preframing all timbers that are used in both bridges and buildings. We work out our designs as carefully as we would for a steel structure, and we encounter no erection difficulties when the material reaches the job. It should be emphasized that the same care in designing the members should be exercised as if it were a steel structure.

Objection to the use of creosoted material for enginehouses has been raised on the ground of the fire risk. Normally, well-seasoned creosoted material does not ignite as readily as untreated wood, particularly if some decay is present on the surface of the latter. However, if a fire does start and gets well under way, it may be more difficult to control. On the other hand, after 25 years, I have to see my first fire in creosoted material in an enginehouse, so that I do not believe the risk is very great.

Lining Turnouts with Heavy Rail

What is the best way to line a main-line turnout in well-ballasted track laid with heavy rail? How many men are needed? What tools? What precautions are necessary?

Make Thorough Preparation

By W. H. Sparks
General Inspector of Track, Chesapeake & Ohio, Russell, Ky.

This question relates to one of the important tasks of the maintenance forces, and one in which many foremen are none too well versed. It may be trite to say that the turnout is the weakest part of the track, but nevertheless this is a fact that must be recognized in the installation and maintenance of turnouts. A switch assembly contains many parts, all of which must fit without lost motion; if they do not, they introduce a hazard to passing trains. Any turnout is likely to get out of line, the same as any other section of track, but turnouts that are used frequently for the diversion of trains are particularly subject to this defect, especially if the diversions are made at high speed.

One should never start a job without adequate preparation; it is of more than ordinary importance when a turnout is to be lined. If the track is well ballasted, as is assumed in the question, it will be difficult to throw and probably will not remain in line with the ballast well packed in the cribs. The first thing to do, therefore, is to clear the ballast from the cribs and from the ends of the ties. The track can then be moved more easily, it will remain in place after lining and will not be raised off the bed, and there will be no stone or other material to roll under the ties and cause uneven surface.

Another reason for clearing the cribs is that in many instances it is desirable to straighten ties that have become slued, and this can be done only with empty cribs. If any ties will need to be renewed within a year, this is an excellent time to make the replacement. This item should also include the track ties for a rail length ahead of the switch and back of the frog, the later on both the through and turnout routes.

Next the track should be gaged, and care should be taken to insure that the spikes fit snugly against the rail base at all points. If this is not done, the track will develop kinks in the line within a short time. The importance of gaging before attempting to do the lining lies in the fact that if the rails are not to gage, or there is any play in the spikes, the lining bars will pull the rail over to position, but it cannot be held to line. If the track is brought to gage before it is lined, both the through and the turnout rails will be in good line, provided the ties are straight and the spikes tight.

It is assumed that a full complement of switch ties are under the turnout and that they extend back far enough so that it is not necessary to lap the crossties back of the frog. Where it is necessary to do this, it is not only difficult to do a good job of lining at this point, but it is equally difficult to hold the line and the surface.

How many men will be needed? This will depend on the amount of traffic, whether the switch is interlocked, the number of the turnout, whether it is part of a crossover, both ends of which are to be lined, and somewhat on local conditions. I would say that on the average, an experienced foreman with 15 men will be able to do the work satisfactorily. Heavy rail sections do not line easily, and in a turnout more men are needed than on ordinary track. It may be in some cases that the work can be done with fewer men, but I would expect to need a few more rather than a few less. In general, the size of the gang will be fixed by the number of lining bars that will be needed, rather than by other features.

In any consideration of this subject, it should be kept in mind that there is only one way to line a turnout. One should take all of the time needed to get everything ready, as outlined, and then have enough men in place to move the track when the lining is started. If the ballast is foul, it should be cleaned or replaced with new ballast. No foreman should leave such a job without assuring himself that every part of the switch —and of the frog, if a spring-rail

frog is in the turnout—is tight and in adjustment.

So far, it has been assumed that the turnout is in a high-speed, heavy-traffic line that is well maintained, as is indicated by the heavy rail and the ballast mentioned in the question. If this is correct, the amount the track must be moved in lining will be small. On the other hand, if the track has not been well maintained and it becomes necessary to do considerably more lining, it may be necessary to loosen the turnout rails until the line on the through route has been corrected, the ties have been tamped and the ballast restored. Then the turnout rails should be lined, gaged and respiked in the order indicated.

Loosen Turnout Rails

By O. G. Prince
Section Foreman, Central of Georgia, Godfrey, Ga.

One should not overlook the importance of this question, for adherence to standard requirements in switch work results in reduced labor and material costs in turnout maintenance. A turnout that is laid with heavy rail and that is well ballasted does not get out of line easily; but when it does, it is correspondingly difficult to line it. Such a turnout will have tie plates, probably with double shoulders, which develop strong resistance to lateral movement of the track. Multiplying the number of rails by two more than doubles this resistance, because the turnout rails are on a curve.

For this reason, to line a turnout of this character, it is desirable to remove the spikes holding the turnout rails all the way from the heel of the switch to the toe of the frog, and from the heel of the frog to the last long switch tie. The track should then be surfaced, and the through route gaged and spiked. Next, spike-line the outer rail of the turnout curve and gage the inner rail to it. No tools other than those used regularly in track maintenance are required, and six to eight men will be enough to handle the job. The same method should be followed when installing a new turnout; that is, the straight rails should be laid first, gaged and lined, and then the turnout rails should be lined and gaged.

Repair Parts for Coaling Plants

What stock of emergency materials should be carried for repairs to a mechanical coaling plant? Where should they be kept?

Too Much Is Wasteful

By L. G. Byrd
Supervisor of Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

In former years, when mechanical coaling plants first came into use, it was the opinion of the division forces, as well as other officers, that an almost complete complement of parts should be carried in stock at some point convenient to the coaling plant, where they would be available at once in the event of a breakdown. Since then, and more particularly in recent years, experience has taught many of us that the tying up of a large amount of money for repair parts represents a real waste. This is especially true of those plants equipped with the later designs of automatic electric motor hoists, where the only spare part required is the hoisting cable, and this need not be ordered until the cable in service gives evidence of approaching failure.

A coaling station is a facility that must be dependable, for the continuity of train service depends on its ability to deliver coal to locomotives as trains arrive. Any failure of the coaling facilities, particularly at a large terminal where many locomotives are handled, is likely to throw the whole operation out of gear and cause serious delays to traffic. However, in a modern coaling plant, there are relatively few parts that cannot be repaired, temporarily at least, in a very short time if the mechanical department or maintenance forces can be gotten to the plant quickly and where oxy-acetylene or electric welding equipment is available.

We have had no delays to trains for many years by reason of failures of the equipment at mechanical coaling plants. Ninety-nine per cent of the failures that would otherwise occur can be prevented by regular and thorough inspections.

Some of our older plants have so many parts that it would be practically impossible to determine what parts should be carried in stock and what should not, for all seem to be about of equal importance. However, we have found it advisable to keep a few spare links where bucket conveyors are in service, and an endless rope for one of our older plants, which is used on the idlers that operate the shaking trough which moves the coal to the conveyor buckets. We do not find it necessary to carry any other parts in stock on the division.

We require daily inspections of all of our coaling stations by an experienced employee. A more thorough inspection is then made every six weeks by a maintenance-of-way employee or by the supervising officer of the district upon which the facility is located, to insure good condition.

Need Few Parts

By General Inspector of Buildings

Our first mechanical coaling plants were a great improvement over the gravity coal chutes which they replaced, except in one respect—they required too much maintenance. The machinery was complicated and some of the parts were hard to get at. Breakage was not uncommon and, unless a stock of parts was kept on hand at or conveniently near the plant, it became necessary at times to coal locomotives by hand or with a locomotive crane, a thing to be avoided if possible. As a result, we acquired the habit of keeping a relatively large emergency stock of materials.

Modern coaling plants are simpler, they have less parts and they do not wear so rapidly or break with the regularity that characterized the older designs. For this reason the requirements for emergency stocks have been almost eliminated. In fact, barring materials with hidden defects, it is not too much to say that, with proper inspection, practically all failures can be foreseen and fixed in time.

Keeps Minimum Stock

By E. Christianson
Assistant Engineer of Buildings, Chicago, Rock Island & Pacific, Chicago

All the emergency stock that we keep on hand at our mechanical coaling plants is a set of power-drive gears and pinions. Emergency cables and aprons are carried in the general storehouse. Our coaling stations are given monthly inspections by the bridge and building foreman on the territory, and parts that are likely to be needed before the next inspection are ordered. This inspection is supplemented by a semi-annual inspection by the division and district officers, which acts as a check.

New Books

Bridge and Building Proceedings

PROCEEDINGS of the American Railway Bridge and Building Association, Forty-Seventh annual convention. 220 pages, illustrated, 6 in. by 9 in., bound in cloth. Published by the Association, F. O. Whiteman, secretary, 332 Dearborn Station, Chicago. Price $2.

Reporting in full the intensive activities at the Forty-Seventh annual convention of the association, held in Chicago, on October 15-17, 1940, this volume contains a wide range of practical information of particular value to those confronted with problems involved in the maintenance of railway bridges, buildings and water service facilities. The feature of the Proceedings in this respect is the committee reports and technical papers and addresses presented before the convention, together with the discussion which followed in each case from the floor. The reports have to do with the mechanization of bridge and building forces; the repair and renewal of ballasted-deck bridges; the storage and delivery of bridge and building materials; protecting steel structures from severe corrosion; the inspection of buildings to formulate the maintenance program; the heating of locomotive terminals and shop buildings; the adjustment of locomotive watering facilities to larger tenders and high-speed trains; and the detection and elimination of termites in railway structures.

The papers and addresses include one on Current Railway Problems, by Bruce E. Dwinell, general attorney, Chicago, Rock Island & Pacific; a second on Bridge and Building and Purchases and Stores Departments Must Co-operate, by H. R. Duncan, superintendent of timber preservation, Chicago, Burlington & Quincy; a third on Bridges on the Shasta Line Division of the Southern Pacific, by Geo. W. Rear, bridge engineer of the Southern Pacific, Coast lines; and a fourth on Streamlining the Smaller Passenger Stations, by Otto Kuhler, consulting designer, New York. Other sections of the volume are given over to a report of the business sessions of the convention, a directory of members and other association matters, and include for the first time a report of the exhibit of the Bridge and Building Supply Men's Association, held during the convention.

Diverting from typographical standards set up many years ago, the 1940 Proceedings have been improved materially in appearance and made more practical from a use standpoint.

Roadmasters' Proceedings

PROCEEDINGS of the Roadmasters' and Maintenance of Way Association of America for 1940, Fifty-Fifth annual convention, 213 pages, illustrated, 7 in. by 10 in., bound in cloth. Published by the Association, F. O. Whiteman, secretary, 332 Dearborn Station, Chicago. Price $2.

The outstanding value in this volume, which is the largest ever published by the association, is that it brings together under one cover the wide range of information on track construction and maintenance, in the form of reports and addresses, with subsequent discussions, presented before the Fifty-Fifth annual convention of the association in Chicago on September 10-12, 1940. The reports contained in the volume have to do with the following subjects:

Slow Orders—Under Present-Day Operating Conditions; Methods and Equipment Best Suited for Ditching and Bank Widening; Welding—Its Uses in Track Work; The Effect of Weight of Rail on Track Maintenance; The Maintenance of Gage Under Today's Higher Speeds; and Handling Snow and Ice—Organization, Equipment and Methods. The addresses deal with the Simplification of Track Work, by C. H. R. Howe, cost engineer, Chesapeake & Ohio; It's Results That Count, by A. E. Perlman, chief engineer of the Denver & Rio Grande Western; Renewing 50,000,000 Ties a Year, by H. R. Clarke, engineer maintenance of way of the Chicago, Burlington & Quincy; and two addresses on Making Work Equipment Work, by J. G. Hartley and Frank H. Rothe, assistant engineers on the Pennsylvania. In addition, the Proceedings present the transactions of the opening and business sessions of the convention; the constitution and by-laws of the association; and a number of special features and changes in typography to improve their appearance and to enhance their value generally.

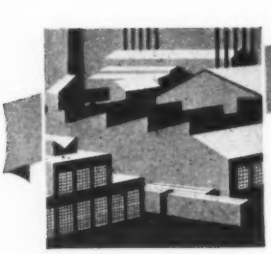
Among the new features incorporated in the book are the presentation of the convention proceedings in chronological order throughout; an officers' portrait page; photographs of all committee chairmen and principal speakers; an increased number of illustrations; more body break-up heads to assist in locating subject matter desired; and a report of the Track Supply Association's exhibit held in connection with the convention.

A.R.E.A. Proceedings

PROCEEDINGS of the American Railway Engineering Association for 1941. 1,158 pages, 6 in. by 9 in. Bound in cloth and half Morocco. Published by the association, 59 East Van Buren street, Chicago. Cloth $8, half Morocco $9.

This volume contains the complete record of the year's work of this Association, including the reports of its 26 standing and special committees, which were presented at the forty-second annual convention at Chicago in March, together with the discussions which followed the presentation of these reports. It also includes addresses by C. H. Buford, vice-president, operations and maintenance, Association of American Railroads, on Transportation and the Defense Program; and by Hon. Clarence F. Lea, chairman, Committee on Interstate and Foreign Commerce, National House of Representatives, on Federal Regulation of Transportation.

The committee reports covered a wide range of subjects, providing valuable reference material on both railway maintenance and operation. Among the 130 subjects considered by the convention, were proposed specifications for the manufacture and installation of hand-operated grain-hopper scales; removal of silica from boiler feed water, and the effect of lubricating oil on boilers; studies on the economics of railway location and operation; discussions of various power machines for use in railway maintenance; tentative specifications for the design of wood bridges and trestles for railway loading; fireproofing wood bridges and trestles; studies on the economics of railway labor; various studies on the value of college men in railway service; methods of determining the protective value of paints; specifications for lining railway tunnels, for concrete culvert pipe and for the solidification of masonry structures by pressure grouting; durability of concrete; statistics on tie renewals and on service records of ties; statistics on rail failures; specifications for placing materials in embankments; studies of track and rail; the joint investigation of fissures in rail; stresses in track; and the report of the Joint Committee on Concrete and Reinforced Concrete.



PRODUCTS of Manufacturers

These Two Devices Help Floor Repairs

THE Flexrock Company, Philadelphia Pa., is offering two new units of equipment for use in applying mas-

Left—Illustrating the Use of the Grid Tamp. Inset—The Tamp Handle is Detachable. Right—A Power Float Machine in Operation.

tic resurfacing materials on floors, the use of which is said to result in economies in labor and materials and to enhance the durability of such floors. One of these is an electrically-operated power float, while the other is a new-type grid tamp.

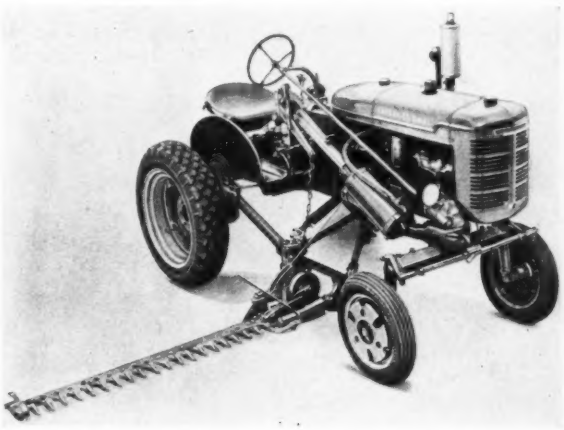
The power float, which may be obtained through purchase or lease from the Flexrock Company, is available in three sizes, the most efficient of which, for large-scale floor-resurfacing jobs, is a model with a 20-in. disk. This machine is powered with a 1½-hp. motor and weighs 230 lb. To enhance its effectiveness, the float is equipped with compactor hammers.

It is pointed out that the power float is applicable especially to floor-resurfacing jobs involving large areas, and in cases where it is employed on such projects it is claimed that the labor required is greatly reduced. When the power float is employed on floor-resurfacing jobs, it is said that drier mixes can be used, resulting in greater strength, toughness and durability. Through the use of the power float, it is pointed out that a high degree of compaction is obtained in the resurfacing material, that a better bond is produced with the underlying surface, and that the proper amount of mortar is brought to the surface to permit troweling.

Like the power float, the grid tamp is designed as a means of securing adequate compaction of the resurfacing material. The tamping end of this tool resembles a piece of metal grating, with 1-in. openings, and is about 1 ft. square. Affixed to this portion of the tool is a detachable metal handle. It is claimed that, when this tool is employed for tamping floor resurfacing mixes, it brings the fines to the top, causes the large aggregate to be more securely anchored, produces a smooth finish and makes possible the use of a low water-cement ratio.

International Tractor Side-Mounted Mower

THE International Harvester Company, Chicago, has developed a combination tractor-mower adapted for off-track right of way mowing, which



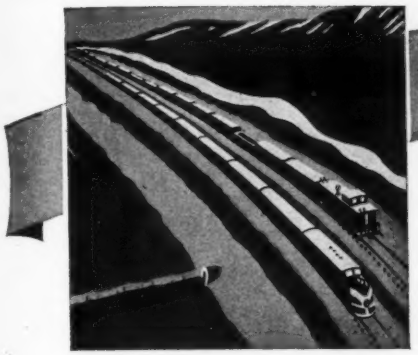
The International "A" Tractor with Side-Mounted Mower Cuts a Five-Foot Swath at Mowing Speeds Up to Six Miles per Hour

cuts a five-foot swath at mowing speeds up to six miles per hour at any angle from 90 deg. above horizontal to 45 deg. below horizontal. The tractor-mower consists of a pneumatic-tired International "A" tractor with a side-mounted mower unit. The mower is mounted ahead of the right rear wheel and is driven by a V-belt from a rear power take-off through a universal torque tube drive and hardened, cut bevel gears, which are enclosed and run in a bath of oil.

The inner shoe of the mower unit can be raised, lowered or held at any level from the ground up to 12 in. above the bottom of the rear tire by means of a hand lift. The inner shoe has a substantial wearing plate which can be easily replaced. A pneumatic power lift controls the angle of the cutter bar and any angle of cut is possible between the limits mentioned from any elevation at which the shoe is held. In addition, the cutter bar can be rotated or tilted.

The mower is counterbalanced by a double spring, permitting the cutter bar to float and follow the contour of the ground. A breakaway is provided for the cutter bar if a solid obstruction is encountered and the cutter bar can be hooked up again by merely backing the tractor. A safety slip clutch mounted on the power take-off drive pulley protects the mower if the knife should be stopped by a hard object getting between the guards and the knife sections. A shield prevents grass and weeds from winding around the shaft of the mower flywheel.

The tractor is powered with a water-cooled, four-cylinder gasoline engine developing a drawbar horsepower of 17.35. The engine operates, under load, at 900 to 1,400 r.p.m. and has a variable governor control. Four forward speeds, ranging from 2¼ to 9-5/8 m.p.h. and a reverse speed of 2¾ m.p.h. are provided. The overall width of the tractor with the cutter bar raised is 69 in. and its overall length is 105 in. The tractor and mower weigh approximately 2,750 lb. Other features include a comfortable, adjustable operator's seat; accessible controls; pedal-operated brakes that can be locked together or used individually for steering; an oil-type air cleaner; replaceable cylinders; full-pressure lubrication with a gear-type oil pump and an oil filter.



NEWS of the Month

Maintenance Expenditures Up

Expenditures for railway maintenance of way and structures in May aggregated $51,640,349, the highest for any May since 1931, and $7,453,144, or 16.9 per cent larger than in May, 1940. During the first five months of 1941, the railways spent $211,152,873 for maintenance of way and structures, a rise of $23,748,181, or 12.7 per cent, over the like 1940 period.

Joint Wage Negotiations Begin

On July 25, at the Morrison Hotel, Chicago, conference committees of the eastern, southeastern, and western railroads met with representatives of the maintenance of way and 13 other non-operating brotherhoods to begin joint negotiations on the demands of the employees for increases in pay filed June 10 and the demands of the managements to revise existing work agreements filed June 7, as reported in the July issue. On the preceding day, the conference committees met with the chairmen of the five operating brotherhoods. The schedule of meetings calls for sessions with each group on every alternate day thereafter.

Lack of Storage Space Complicates Handling of Wheat Crop

Despite adequate transportation service rendered by the railways, the movement of the 1941 wheat crop has been retarded seriously by a lack of elevator space. This lack of storage space has been caused by the huge carry-over of government-loan wheat from 1939 and 1940 crops, which fill this space throughout the country. This lack of space became so acute that the Car Service division of the Association of American Railroads, in conjunction with the Kansas City, Mo., Board of Trade issued instructions to the railroads to refuse to accept any wheat consigned for storage at that point. These instructions were later expanded to include Salina, Kan.; St. Louis, Mo., Minneapolis, Minn., St. Paul, Duluth, Superior, Wis., and Cincinnati, Ohio, and conditions at Chicago are reported to be getting critical.

Forecasts Loadings to Reach a Million Cars a Week

During the Senate hearings in July on the second deficiency appropriation bill, Chairman Joseph B. Eastman and Commissioner J. Monroe Johnson of the Interstate Commerce Commission expressed the belief that the railroads may be called upon to carry 1,000,000 carloads weekly during the coming fall. Chairman Eastman explained to the committee that the commission has broad powers to deal with congestion in railroad traffic. "We want to be ready for the exercise of those powers," he continued, "because it is apparent that the transportation situation is going to be very tight. The railroads have been doing a splendid job so far. They are endeavoring to do what was not done at the time of the last war, and that is to keep the cars rolling and prevent their use for storage purposes."

Commissioner Johnson took up where Mr. Eastman left off in his testimony, declaring that the commission feels that traffic will increase to about 1,000,000 carloads a week this fall. "We still believe," he asserted, "that if the Association of American Railroads and we do our full duty we can handle close to 1,000,000 cars a week. But it will be close and very difficult, and every car must be unloaded promptly, and no man can get more cars than he needs. . . 1,000,000 cars a week is going to have everybody on his toes."

Budd Says Railroads Can't Spare Mechanics

In reply to a suggestion made on July 22, by Sidney Hillman, associate director general of the Office of Production Management, to a conference of railroad officers and railroad leaders, that 100,000 of the railroad's 400,000 mechanics be diverted to national defense industries, particularly aircraft production, Ralph Budd, transportation commissioner of the National Defense Advisory Commission, declared, "I have never heard of a suggestion more threatening to the transportation structure during the defense emergency. Railroads not only cannot sacrifice man-power at this time but they need every available mechanical service if they are to escape being crippled." After all, he observed, it won't do much good to produce all the military equipment if the country hasn't the transportation system to transport the materials.

Car Building Lagging

On July 14, Ralph Budd, transportation commissioner of the National Defense Advisory Commission, told a meeting of directors of the American Short Line Railroad Association at Chicago that car builders are already behind about 7,500 cars on their orders and, at the rate of present interruptions due to shortages of material, may fall 20,000 cars short of the program set up for completion by October 1. Unless materials are released for railway use, he added, the program will fall down even more in the future because, for the year ending October 1, 1942, the railways had hoped to add 120,000 cars to their ownership. This would mean, with retirements included, a 160,000 car program for that twelve-month period.

In discussing the railroad traffic capacity, Mr. Budd said, "Increased speed while on the road is not so important as maintaining continuous movement. This is apparent when we remember that the average freight car is actually moving in trains only about 10 per cent of the time, or a little over 2½ hours out of the 24.

"Nothing that I know of promises so much in the way of increasing total railway capacity as an earnest effort to eliminate all possible waste of time in placing loaded cars, in unloading them, in loading empty cars and getting them on the way. This effort, together with a determination to load cars heavier, might even result in increasing the carrying capacity of the existing railway cars by as much as 25 per cent."

Military Service Credits For Railroad Retirement Benefits

The Railroad Retirement Board has submitted to Chairman Wheeler of the Senate committee on interstate commerce and Chairman Lea of the House committee on interstate and foreign commerce, reports favoring enactment of S. 1224 and H. R. 3984, identical bills introduced respectively by Mr. Wheeler and Representative Crosser, Democrat of Ohio, to extend the crediting of military service under the Railroad Retirement Act. The Board pointed out that the Second Revenue Act of 1940 provided for the crediting of certain periods of military service rendered prior to January 1, 1937. It sees no reason why a similar policy should not be adopted with respect to military service rendered after that date. The bills would make such an extension, including in the military-service period any period subsequent to September 7, 1939, with respect to which a state of national emergency shall have been declared to exist.

The Wheeler-Crosser bill provides that for each month of military service the individual shall, for death benefit purposes, be credited with compensation of $150 a month. The Board recommends that this be increased to $160 as more representative of the average monthly wages of covered employees. This provision would affect only computation of death benefits; the calculation of annuities would be affected only by the lengthening of the service period.

Personal Mention

General

J. G. Hunter, whose promotion to assistant superintendent of the Shenandoah division of the Norfolk & Western, with headquarters at Roanoke, Va., was reported in the June issue, entered the service of the Norfolk & Western in July, 1925, as a chainman in the engineering department, then serving successively as a rodman, inspector, levelman and transitman. On May 16, 1937, he was promoted to assistant roadmaster of the Norfolk division, being further advanced to supervisor of bridges and buildings of the Radford division on October 1, 1938, which position he continued to hold until his recent promotion to assistant superintendent.

James W. Kern, superintendent of the Kentucky division of the Illinois Central, with headquarters at Paducah, Ky., and an engineer by training and experience, retired on July 1, because of ill health. Mr. Kern was born at Alexandria, Va., on July 26, 1887, and attended Washington & Lee University, Lexington, Va. He entered railway service in 1905 as a chairman in the engineering department of the Illinois Central, later being promoted successively to rodman, instrumentman, resident engineer, assistant engineer and supervisor of track. During the first World War he served with the 13th Engineers of the U. S. Army successively as 2nd lieutenant, 1st lieutenant and captain. He returned to the Illinois Central in 1919 as division engineer of the Mississippi division, later being transferred to the St. Louis division. In 1923 he was promoted to district engineer with headquarters at New Orleans, La., and in 1929 he was advanced to superintendent of the Springfield division, with headquarters at Clinton, Ill. Mr. Kern was transferred to the Kentucky division in 1935.

Gideon J. Willingham, trainmaster on the Illinois Central at Champaign, Ill., and an engineer by training and experience, has been promoted to superintendent of the Illinois division, with the same headquarters. Mr. Willingham was born at Maxfield, Ky., on February 12, 1900, and attended college for two years. He entered railway service on September 10, 1917, as a rodman on the Illinois Central at Fulton, Ky., and on September 8, 1922, was promoted to instrumentman at Carbondale, Ill. On November 1, 1923, he was appointed general foreman at East St. Louis, Ill., and six months later he was appointed resident engineer at that point. On March 1, 1926, he was transferred to the Edgewood-Fulton cut-off and on May 1, 1928, he was appointed track supervisor, with headquarters at Bluford, Ill. Mr. Willingham was promoted to supervisor of trains and tracks at Metropolis, Ill., on August 15, 1930, and on April 1, 1937, he was advanced to trainmaster at Fulton, Ky. He was later transferred to Council Bluffs, Iowa, and Champaign, being located at the latter point at the time of his recent promotion, which was effective July 1.

Gideon J. Willingham

Henry H. Garrigues, former chief engineer maintenance of way of the Eastern region of the Pennsylvania, who has been on leave of absence because of illness since October, 1940, has been appointed assistant to the general manager of the Eastern region, with headquarters at Philadelphia, Pa. Mr. Garrigues was born on September 4, 1881, at Harrisburg, Pa. He was educated at Haverford School and Haverford College and entered the service of the Pennsylvania on February 18, 1901, at Lambertville, N.J. On March 21, 1903, he was transferred to the Philadelphia division as a rodman and on September 2 of the same year he went to Altoona, Pa., as a transitman. He was assistant supervisor at Altoona, Pitcairn, Pa., and Perryville, Md., from January, 1904, to December 1, 1908. He then served as supervisor on the Allegheny, Atlantic, Philadelphia and Baltimore divisions, later in the valuation department and general manager's office. From December, 1917, to March, 1920, Mr. Garrigues was division engineer on the Trenton and the Philadelphia Terminal divisions and from March to May, 1920, he was engineer maintenance of way. From May, 1920, to January, 1926, he served successively as superintendent of the Delaware, Atlantic, Philadelphia Terminal and Cleveland and Pittsburgh divisions and as general superintendent at Chicago. In January, 1926, he became general superintendent of the Eastern Pennsylvania division at Harrisburg, being transferred to the Central Pennsylvania division at Williamsport, Pa., on July 1, 1933. He was appointed chief engineer maintenance of way of the Eastern region at Philadelphia on May 1, 1939, serving in this capacity until October, 1940, when he was granted a leave of absence because of illness.

Henry H. Garrigues

Engineering

G. M. Taylor, district engineer on the Southern Pacific at Dunsmuir, Cal., has been appointed division engineer of the newly-created Shasta division, with the same headquarters and **D. H. Talt** has been appointed assistant division engineer at Dunsmuir.

Orville W. Stephens, track supervisor on the Delaware & Hudson, with headquarters at Oneonta, N.Y., has been promoted to assistant engineer of structures, with headquarters at Albany, N.Y. **Joseph C. Brennan,** a transitman at Albany, has been promoted to assistant engineer with the same headquarters.

Lee Mayfield, assistant bridge and building supervisor on the Gulf Coast Lines (part of the Missouri Pacific system) at San Antonio, Tex., has been appointed resident engineer at Lottie, La., for the construction of the high level crossing over the Morganza Floodway, and **W. C. Sneed,** transitman, has been appointed assistant engineer at Lottie.

Charles H. Blackman, assistant chief engineer of the Louisville & Nashville, has been promoted, effective July 1, to chief engineer, with headquarters as before at Louisville, Ky. A biographical sketch of Mr. Blackman's career, and a photograph were published in the April issue, following his promotion to assistant chief engineer on March 1. Mr. Blackman succeeds **G. R. Smiley,** whose death on June 10 was reported in the July issue.

W. M. Jaekle, assistant division engineer on the Southern Pacific at Ogden, Utah, has been transferred to Oakland Pier, Cal., succeeding **O. M. Barlow,** whose promotion to division engineer of the Western division, with the same headquarters, was reported in the July issue. **C. H. Owen** has been appointed assistant division engineer at Ogden, relieving Mr. Jaekle. **J. C. Wheeler** has been appointed assistant division engineer at Tucson, Ariz., replacing **R. L. Drane** and **H. C. Stull** has been appointed assistant division engineer at El Paso, Tex., succeeding **W. T. Black.**

T. E. McMannis, supervisor of track on the Central of New Jersey, with headquarters at Somerville, N.J., has been promoted to the newly-created position of division engineer of the Central division, including the Southern subdivision of this division and the New York & Long Branch Railroad, which is owned jointly by the Jersey Central and the Pennsylvania. His headquarters are in Jersey City, N.J. **C. H. Vogt,** supervisor of track at Jersey City, has been appointed to the newly-created position of assistant division engineer of the Central division, with the same headquarters. **J. R. Prizer,** assistant division engineer

of the Lehigh & Susquehanna division, with headquarters at Mauch Chunk, Pa., has been promoted to the newly-created position of division engineer of that division with the same headquarters.

W. Jay Foster, whose retirement as engineer of grade crossings of the Erie, with headquarters at Cleveland, Ohio, was reported in the July issue, was born in

W. Jay Foster

1876 and entered railway service on July 1, 1893, as a chainman on the Buffalo division of the Erie. He was promoted through various positions to head draftsman at New York, and, in 1913, he returned to field work as district engineer in charge of double tracking the Chicago & Erie (now the Erie) from Decatur, Ind., to Griffith. Mr. Foster was promoted to engineer of grade crossings in 1925, which position he held until his retirement.

Claude V. Bucher, whose promotion to division engineer on the New York Central, with headquarters at Columbus, Ohio, was reported in the June issue, was born at Doylestown, Ohio, on July 31, 1886, and graduated from Ohio State University in 1908. He entered railway service with the Pennsylvania in 1906 between terms of school, and in 1909 he went with the Toledo & Ohio Central (now part of the New York Central) in the engineering department at Bucyrus, Ohio. Mr. Bucher was later transferred successively to Columbus, Ohio, Charleston, W. Va., and Cleveland, Ohio. He was located at the latter point as assistant engineer in the office of the division engineer at the time of his recent promotion, which was effective June 1.

J. A. Bragg, whose promotion to assistant division engineer of the Ashland division of the Chesapeake & Ohio, with headquarters at Ashland, Ky., was reported in the July issue, was born on June 18, 1903, at Hinton, W. Va., and attended Marshall college, Huntington, W. Va. Early in his career, Mr. Bragg served as an engineer with various concerns, including an engineering company, a municipality and a coal company. On September 15, 1923, he entered railway service with the Chesapeake & Ohio as a rodman on the Huntington division, later serving as a masonry inspector on this division and on the Clifton Forge division, as an instrumentman on the Huntington division, and as a draftsman on the Cincinnati division. On July 15, 1928, he was advanced to assistant cost engineer on the Huntington division, holding this position until December 11, 1931, when he was further advanced to supervisor of track on the same division. He remained in the latter capacity until the time of his recent appointment as assistant division engineer.

Charles H. Hitchcock, whose retirement as engineer of grade crossings of the Reading, with headquarters at Philadelphia, Pa., was reported in the July issue, was born on May 24, 1873, at Philadelphia, and after a public school education he entered railway service with the Reading in November, 1891, serving as a rodman, levelman and transitman. In 1900, Mr. Hitchcock left this company to go with the Cuban Steel Ore Company as engineer in charge of a large terminal construction project in Cuba. In November, 1901, he returned to the Reading as a draftsman, later becoming an inspector. On July 1, 1904, Mr. Hitchcock became an assistant engineer, which position he held until December 31, 1926, when he was promoted to design engineer. Subsequently he was advanced to engineer of grade crossings, holding this position until his retirement.

Rossel L. Cook, whose promotion to assistant chief engineer of the Central of Georgia at Savannah, Ga., was reported in the July issue, was born on January 8, 1887, at Mattoon, Ill. He attended the public schools of Bellefontaine, Ohio, and was graduated from Ohio State University in 1911 with a degree in civil engineering. Mr. Cook entered railroad service on December 19, 1906, serving for 18 months in the engineering department of the Pennsylvania, then serving for six months as engineer for the Red Jacket Coal Company at Matewan, W. Va., prior to completion of his college education. Mr. Cook entered the service of the Central of Georgia as a draftsman at Savan-

Rossel L. Cook

nah in June, 1911, and served successively as instrumentman, assistant engineer, principal assistant engineer and office engineer, holding the latter position at the time of his recent promotion to assistant chief engineer.

John E. Rogan, whose promotion to assistant engineer maintenance of way on the Illinois Central, with headquarters at Chicago, was reported in the June issue, was born at New Orleans, La., on November 3, 1886, and graduated in civil engineering from Tulane University in 1907. He entered railway service in that year as a section foreman on the Illinois Central, and in September, 1913, was promoted to track supervisor of the New Orleans terminal. Mr. Rogan was ad-

John E. Rogan

vanced to division engineer of the New Orleans terminal in February, 1919. In September, 1931, his jurisdiction was extended to include the Louisiana division and the Gulf & Ship Island (part of the Illinois Central system), and his headquarters were transferred to McComb, Miss. On October 1, 1939, he was appointed trainmaster of the New Orleans terminal, with headquarters at New Orleans, which position he held until his recent promotion, effective June 1.

Robert J. Gammie, engineer maintenance of way of the Texas & Pacific, has been promoted to chief engineer, with headquarters as before at Dallas, Tex., succeeding **E. F. Mitchell,** who retired as chief engineer on August 1, and has been appointed consulting engineer. A photograph and biographical sketch of Mr. Gammie were published in the February issue, page 108, following his promotion to engineer maintenance of way. The position of engineer maintenance of way has been abolished.

Mr. Mitchell was born at McVeytown, Pa., on July 19, 1864, and was educated in private schools. He entered railway service in 1878 as an axman in the engineering department of the Pennsylvania, later serving as a draftsman, instrumentman, and topographer on location and construction surveys. In 1884 he was transferred to engineering work in the maintenance of way department, and in 1887 he went with the Norfolk & Western as an assistant engineer. The following year, Mr. Mitchell was promoted to division engineer of the Radford division, later being transferred successively to the Flat Top and Eastern divisions. In 1890 he went with the Denver & Rio Grande (now the Denver & Rio Grande Western) as an assistant engineer, and two years later he left railroad service to engage in private civil and mining engineering practice in Colorado. In 1900 Mr. Mitchell returned to the Denver & Rio Grande as

an assistant engineer, and in 1901 he became chief engineer of the San Luis Valley Land & Mining Co., in Colorado. From 1905 to 1912 he served as engineer of construction and chief engineer of the Missouri Pacific, and for the next four years engaged in private practice as a consulting engineer. In 1916 he was appointed engineer of the Western Group, Engineering Committee of the President's Conference Committee on federal valuation of the railroads. On April 1, 1917, Mr. Mitchell was appointed chief engineer of the Texas & Pacific, with headquarters at Dallas.

Lewis H. Bond, Jr., track supervisor on the Illinois Central at Effingham, Ill., has been promoted to assistant engineer, with headquarters at Chicago. Mr. Bond was born at Harrodsburg, Ky., on April 11, 1902, and graduated in engineering from the University of Illinois in 1926. He entered railway service during his summer vacation from school in 1920, as a draftsman on the Illinois Central at Chicago and the following summers, until graduation from college, served in the engineering department on construction work. In June, 1926, he was appointed a rodman at Fort Dodge, Iowa, and three months later he was promoted to instrumentman at Paducah, Ky. A year later he was transferred to Vicksburg, Miss., and in July, 1928, he was transferred to Fulton, Ky. Four years later he was transferred to Carbondale, Ill., and in January, 1937,

Lewis H. Bond, Jr.

he was promoted to track supervisor at Olney, Ill. Mr. Bond was transferred to Effingham in May, 1938, where he remained until his recent promotion.

A. C. Clarke, assistant chief engineer of the Baltimore & Ohio, with headquarters at Pittsburgh, Pa., has been promoted to chief engineer, with headquarters at Baltimore, Md., succeeding **H. A. Lane,** whose death on June 21 is reported elsewhere in these columns. Mr. Clarke was born at Granton, Ont., on May 16, 1888, and was graduated in civil engineering from Purdue University. Mr. Clarke entered railroad service with the Lake Shore & Michigan Southern (now New York Central) at South Bend, Ind., and after serving in various capacities with that road he became a Canadian customs officer at Regina, Sask., in 1907. Mr. Clarke was connected with the Canadian Government survey and retracement in the Province of Saskatchewan in 1908. He was also assistant engineer on base line and exploration work in northern Saskatchewan, and in 1911 was in charge of field work for one of the large engineering companies of western Canada, at Regina. On July 1, 1915, Mr. Clarke went with the Baltimore & Ohio in the operating department, conducting investigations and preparing special reports on operating and industrial projects. He was transferred to the commercial development de-

A. C. Clarke

partment in July, 1916, and in May, 1917, he was appointed assistant engineer of surveys. He was promoted to district engineer at Pittsburgh on November 1, 1918, and on October 1, 1930, was advanced to assistant chief engineer.

Wellesley T. Richards, whose appointment as chief engineer of the Sacramento Northern, with headquarters at Sacramento, Cal., was reported in the July issue, was born at Benson, Ariz., on April 18, 1889, and entered railway service on preliminary location and reconnaissance surveys in California. In December, 1909, he was appointed instrument man on the Southern Pacific, later serving as assistant engineer, section foreman, extra gang foreman and assistant roadmaster on the Los Angeles and San Joaquin divisions. In February, 1913, he went with the California Western Railroad & Navigation Company (controlled by the Union Lumber Company), as general foreman on construction work at Fort Bragg, Cal. A year later he went with the Northwestern Pacific as assistant engineer, later serving as extra gang foreman and assistant division engineer at Sausalito, Cal., and Eureka. In May, 1917, he was called to military service and served two years in France with the 18th Engineers, Railway, advancing from private to captain. In September, 1919, Mr. Richards became building superintendent on reinforced concrete factory construction at Los Angeles, Cal., and in October, 1920, he became chief engineer of the San Francisco-Sacramento Railroad Company, with headquarters at Oakland, Cal. In January, 1929, he went with the Sacramento Northern as bridge and building supervisor, with headquarters at Oakland, and he was later promoted to bridge engineer, with the same headquarters, the position he held until his recent promotion.

Samuel R. Hursh, whose appointment as chief engineer maintenance of way of the Eastern region of the Pennsylvania at Philadelphia, Pa., was reported in the July issue, was born at Mifflinburg, Pa., on March 20, 1894, and was graduated in civil engineering from Pennsylvania State College in 1916. Mr. Hursh entered railroad service on June 24, 1916, as a chainman on the Philadelphia Terminal division of the Pennsylvania and served as a rodman on the Tyrone division from January to May, 1917, when he was furloughed for military service. From January to June, 1919, Mr. Hursh was assistant supervisor of the Maryland division of the Pennsylvania, then serving in that capacity in the general office at Philadelphia, and on the Delaware, the Williamsport, the Baltimore, and the Maryland divisions. On October 9, 1926, Mr. Hursh became supervisor of the West Jersey & Seashore (now Pennsylvania-Reading Seashore Lines) and on October 1, 1927, he was appointed supervisor of the Philadelphia Terminal division of the Pennsylvania. On November 10, 1928, he became division engineer of the Atlantic division and the West Jersey & Seashore, being transferred to the Philadelphia Terminal division on December 16, 1929, and to the Pittsburgh division on July 1, 1933. On October 1, 1934, Mr. Hursh was appointed superintendent of the Wilkes-Barre division, being transferred to the Maryland division on April 1, 1935. On July 16, 1938, he became engineer maintenance of

Samuel R. Hursh

way of the Eastern Pennsylvania division, being appointed acting chief engineer maintenance of way of the Eastern region in October, 1940, the position he held until his recent appointment as chief engineer maintenance of way.

Robert Waller Marye, principal assistant engineer of the Atlantic Coast Line, with headquarters at Wilmington, N.C., has been promoted to assistant chief engineer, with the same headquarters, and **Robert Lawrence Groover,** engineer of design, has been promoted to principal assistant engineer, with headquarters as before at Wilmington,. succeeding Mr Marye.

Mr. Marye was born at Ashland, Va., on December 5, 1891, and attended Randolph Macon College, graduating in 1912. He entered railroad service on December 5, 1912, with the Atlantic Coast Line,

serving successively as rodman, inspector and transitman in the construction department. From May 25, 1915, to October 10, 1916, Mr. Marye served successively as rodman, instrumentman and draftsman in the valuation department and on the latter date he became a resident engineer in the construction department. From August, 1917, to July, 1919, he served with the United States Army, returning to the Atlantic Coast Line on the latter date as senior assistant engineer in the construction and maintenance of way departments. He served successively as division engineer, assistant engineer of construction, field assistant to chief engineer and assistant to chief engineer from December 1, 1925, to January 1, 1935. On the latter date he was appointed principal assistant engineer.

Mr. Groover was born on November 7, 1891, in Brooks county, Ga. He graduated in civil engineering from Alabama Polytechnic Institute, Auburn, Ala., in 1914 and entered railroad service in September of that year with the Atlantic Coast Line. He served as draftsman and inspector at Rocky Mount, N.C., until March, 1916, when he became a draftsman for the Central of Georgia at Savannah, Ga. In November, 1916, he returned to the Atlantic Coast Line at Wilmington and served until September, 1918, as draftsman, computer and pilot engineer in the valuation department. On the latter date he was appointed assistant engineer in the maintenance of way department at Rocky Mount and from June, 1920, to November, 1924, he served as assistant engineer in the chief engineer's office at Wilmington, N.C., working on valuation reports, in the bridge engineer's office and with the office engineer on track plans and design. From November, 1924, to October, 1929, Mr. Groover was office engineer in the chief engineer's office at Wilmington and on the latter date he became engineer of design.

Track

Eston Royse, roadmaster on the Denver & Rio Grande Western, with headquarters at Gunnison, Colo., has been transferred to Green River, Utah, succeeding **Dan Quinn,** who retired on July 15. **J. F. Selby** has been appointed assistant roadmaster at Helper, Utah, a temporary position.

Charles W. Reeve, a draftsman on the Delaware & Hudson, with headquarters at Albany, N.Y., has been promoted to track supervisor at Oneonta, N.Y., to succeed **Orville W. Stephens,** whose appointment as assistant engineer of structures is mentioned elsewhere in these columns.

C. J. Langenbach, assistant supervisor of track on the Central of New Jersey at Long Branch, N.J., has been promoted to supervisor of track, with headquarters at Somerville, N.J., succeeding **T. E. McMannis,** whose appointment as division engineer is noted elsewhere in these columns.

L. J. Overman, roadmaster on the Union Pacific at Salina, Kan., has been promoted to general roadmaster, with headquarters at Kansas City, Mo., succeeding **M. T. Dearden,** who has been appointed roadmaster at Green River, Wyo. Mr. Dearden relieves **Roscoe Wilson,** who has been transferred to Salina, replacing Mr. Overman.

A. T. Simpson, section foreman on the Southern Pacific at Duran, N.M., has been promoted to roadmaster at Yuma, Ariz., succeeding **B. F. Pennington,** who has been transferred to Niland, Cal. Mr. Pennington succeeds **Danny J. O'Keefe,** who has been transferred to Tehachapi, Cal., relieving **Thomas Duggan,** who has retired.

I. C. Golab, assistant on the engineering corps of the New York zone of the Pennsylvania, has been promoted to assistant branch line supervisor of track on the Columbus division, with headquarters at Columbus, Ohio, succeeding **J. A. Blalock,** who has been advanced to assistant main line supervisor of track on the Pittsburgh division, with headquarters at East Liberty, Pa.

L. E. Webb, a section foreman on the St. Louis division of the Illinois Central, has been promoted to track supervisor at Reevesville, Ill., succeeding **G. W. Davis,** who has been transferred to Effingham, Ill. Mr. Davis relieves **L. H. Bond, Jr.,** whose promotion to assistant engineer, is reported elsewhere in these columns.

L. C. Smith, roadmaster on the Chicago & North Western at Eagle Grove, Iowa, has been transferred to Green Bay, Wis., succeeding **J. L. McElroy,** who retired on June 15, after 43 years of service. **B. F. Hagar,** roadmaster at Fond du Lac, Wis., has been transferred to Eagle Grove, relieving Mr. Smith, and **M. A. Haessly,** roadmaster at Wall Lake, Iowa, has been transferred to Fond du Lac.

Leslie G. Bell, a laborer on the New York Central, has been promoted to assistant supervisor of track of Subdivision 27 of the Pennsylvania division, with headquarters at Clearfield, Pa., succeeding **R. C. Swanson,** who has been transferred to Subdivision 22 of the Mohawk division, with headquarters at South Schenectady, N.Y., to replace **M. Moryks,** who has been transferred to Subdivision 7 of the same division, with headquarters at Utica, N.Y. Mr. Moryks succeeds **J. Donnelly,** who has retired.

W. R. Benish, a draftsman in the office of the engineer maintenance of way at New York, has been promoted to assistant supervisor of track of Subdivision 30 of the Buffalo division, with headquarters at Rochester, N.Y., replacing **E. T. Delaney,** who has been transferred to Subdivision 9 of the Syracuse division, with headquarters at Syracuse, N.Y., succeeding **A. Peronne,** deceased.

John Keith Geisel, assistant supervisor of track on the Detroit-Grand Rapids division of the Pere Marquette, has been promoted to supervisor of track, with headquarters at Edmore, Mich., succeeding **William A. Carlson,** who has been transferred to Grand Ledge, Mich., relieving **William Meier,** who retired on July 1, after 50 years service.

Mr. Geisel was born at Mulliken, Mich., on February 27, 1900, and entered railway service in the spring of 1918 as a section laborer on the Pere Marquette. He left railway service in 1925, but returned in April, 1931, as an extra gang laborer on the Pere Marquette, later becoming a section laborer at Grand Ledge, Mich. In the spring of 1935 he was promoted to extra gang foreman and served in that capacity and as a track patrolman and section foreman until April 7, 1941, when he was advanced to assistant supervisor of track between Detroit, Mich., and Grand Rapids.

E. C. Barnes, whose promotion to roadmaster on the Denver & Rio Grande Western, with headquarters at Minturn, Colo., was reported in the June issue, was born at Fountain, Colo., on October 19, 1908, and entered railway service on June 2, 1924, as a section laborer at Parkdale, Colo. He was later promoted to track walker and then to rail machine operator. In 1930, he was promoted to relief foreman, and in 1935 he was assigned a regular section. Mr. Barnes served also as an extra gang foreman from 1936 to 1939, and in the latter year was promoted to track supervisor.

Quitman M. Young, whose promotion to track supervisor on the Illinois Central at Yazoo City, Miss., was reported in the June issue, was born at Hazelhurst, Miss., on April 2, 1894, and entered railroad service on August 11, 1911, as a section laborer at Beauregard, Miss. In 1915 he was promoted to assistant section foreman on the Louisiana division, and on November 1, 1916, he was appointed relief foreman on that division. On May 1, 1917, he was advanced to section foreman, and from April 4, 1940, to December 1, 1940, he served as an extra gang foreman. On the latter date Mr. Young was appointed acting track supervisor at Yazoo City, which position he held until his promotion to track supervisor.

Julius F. Larson, whose retirement on May 1 as roadmaster on the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Glencoe, Minn., was reported in the June issue, was born at McGregor, Iowa, on October 25, 1877, and entered railway service on the Milwaukee in 1893. In the spring of 1906, he was appointed roadmaster at Mendota, Ill., and a year later he was transferred to Farmington, Minn. During the next five years he served as roadmaster at Farmington and at Minneapolis, Minn., being transferred back and forth between these two points several times. In the spring of 1912, Mr. Larson was transferred to Cologne, Minn., and in the fall of 1913, to Glencoe.

J. E. Smith, whose promotion to supervisor of track on the New York Central, with headquarters at Rochester, N. Y., was reported in the July issue, was born on May 11, 1898, at Newburgh, and after a public school education he entered railway service with the New York Central as a laborer on the River division. On December 16, 1924, he was advanced to track foreman, and on March 16, 1933, he was further promoted to assistant supervisor of track on the River division, with headquarters at Kingston, N. Y. On May 1, 1935, he was transferred to the Syracuse division, with headquarters at Lyons, N. Y., being further transferred to the Electric division at Harmon on November 1,

1939. He remained at the latter point until his recent promotion to supervisor of track at Rochester.

D. E. Fuller, whose promotion to supervisor of track on the New York Central, with headquarters at Remsen, N. Y., was reported in the July issue, was born on July 25, 1899, at Colton, N. Y. After a public school education, he entered railway service with the New York Central on January 29, 1920, as a chainman on the engineer corps of the Buffalo division. On May 1 of the same year, Mr. Fuller was advanced to rodman on the same division, and on March 1, 1922, he was promoted to transitman on the Syracuse division. On January 24, 1935, Mr. Fuller was further promoted to assistant supervisor of track on the Buffalo division, which position he held until his recent appointment as supervisor of track at Remsen.

Starke Penn Critz, whose promotion to track supervisor on the Illinois Central, with headquarters at McComb, Miss., was reported in the June issue, was born at Starkville, Miss., on October 21, 1894, and graduated in civil engineering from Mississippi State College. He entered railway service on October 21, 1915, as a chainman on the St. Louis division of the Illinois Central at Carbondale, Ill., and on February 15, 1917, was promoted to rodman. Three months later he was advanced to instrumentman at Vicksburg, Miss., and on August 1, 1917, he entered military service, seeing service overseas. He returned to the Illinois Central as an instrumentman at Memphis on April 2, 1919, and on July 20, 1925, he was promoted to resident engineer on construction at Central City, Ky. On September 16, 1926, he was appointed an assistant engineer on valuation and inventory work and later served as an assistant engineer on the Greenville division at Greenville, Miss., and on the Tennessee division at Fulton, Ky. On September 21, 1931, Mr. Critz was appointed an instrumentman and on June 25, 1934, he was appointed a rodman. He was advanced to instrumentman at McComb, Miss., on July 1, 1938, the position he held until his recent promotion.

Effective June 1, **E. G. Adams,** supervisor of track in the office of the chief engineer of the Eastern region of the Pennsylvania, with headquarters at Philadelphia, Pa., was appointed branch line supervisor of track on the Philadelphia division, with headquarters at Harrisburg, Pa., succeeding **T. M. Goodfellow,** who was appointed main line supervisor with the same headquarters, to replace **L. G. Walker,** whose appointment as assistant division engineer of the Ft. Wayne division was noted in the July issue. Also effective June 1, **G. W. Peoples,** assistant supervisor of track at Altoona, Pa., was promoted to supervisor of track, with headquarters at Kane, Pa., and **W. G. Pfohl,** supervisor of track on special duty in the office of the vice-president and comptroller at Philadelphia, was transferred to the Philadelphia Terminal division.

On July 1, Mr. Adams was further transferred to the office of the general purchasing agent of the system, with headquarters at Philadelphia, and was succeeded as branch line supervisor of track at Harrisburg by **C. F. Parvin,** assistant supervisor of track at Lancaster, Pa. **N. Olsen,** assistant supervisor of track at East Liberty, Pa., was transferred to Lancaster to replace Mr. Parvin. Also effective on July 1, **H. D. Sipe,** assistant on the engineer corps of the Central region, was promoted to assistant supervisor of track, with headquarters at Harrisburg, to succeed **D. C. Hastings,** who was transferred to Pittsburgh, Pa.

Edward Wollett, Jr., assistant on the engineer corps of the Western region, has been promoted to assistant supervisor of track on the New York division, with headquarters at Jamesburg, N. J., to succeed **W. H. Shoemaker,** who has been transferred to the Philadelphia Terminal division, with headquarters at West Philadelphia. Mr. Shoemaker succeeds **J. M. Minturn,** who has been promoted to supervisor of track, with headquarters at Cleveland, Ohio.

Bridge and Building

George H. Cole has been appointed assistant supervisor of bridges and buildings on the Union Pacific at Cheyenne, Wyo.

L. R. McAllister, assistant bridge and building supervisor on the Portland division of the Southern Pacific, has been promoted to supervisor of bridges and buildings at Los Angeles, Cal., succeeding **C. C. Hyatt.**

V. W. Hutchings, assistant supervisor of bridges and buildings on the Southern Pacific at Bakersfield, Cal., has been promoted to supervisor of bridges and buildings, with the same headquarters, succeeding **J. R. Hutchins,** deceased. **Howard Herrick,** bridge and building foreman at Los Angeles, Cal., has been advanced to assistant supervisor of bridges and buildings at Bakersfield, replacing Mr. Hutchings.

Buell E. Arnold, whose promotion to supervisor of bridges and buildings on the Union Pacific at Omaha, Neb., was reported in the June issue, was born at Miller, Neb., on January 31, 1902, and entered railway service during the summer of 1916, as a section laborer on the Union Pacific at Miller. During the following two summers he served as a fence gang laborer in the bridge and building department and also served in that capacity from November, 1919, to March, 1920. In December, 1920, Mr. Arnold was promoted to carpenter in a bridge and building gang, and in August, 1935, he was advanced to foreman, which position he held until his recent promotion. All of his service has been on the Nebraska division.

Edwin C. Neville, whose retirement as bridge and building master of the Toronto Terminals division and part of the London division of the Canadian National, with headquarters at Toronto, Ont., was reported in the July issue, was born at Port Talbot, Ont., in June, 1876, and first entered railway service in 1898, in the freight department of the Grand Trunk (now part of the Canadian National) at St. Thomas, Ont. A short time later he was appointed assistant baggage master at Windsor, Ont., and after a year in the latter capacity he was sent to Toronto as a checker in the Union Station. In April, 1900, Mr. Neville left the Grand Trunk to go with the Algoma Central on construction work, leaving this company in June, 1901, to become connected with a contracting company in Wheeling, W. Va. In 1908, he returned to Canada, serving on various railroad bridge construction projects until February, 1911, when he again entered the service of the Grand Trunk as an extra gang foreman on grade separation work at Toronto. In June, 1920, he was promoted to bridge and building supervisor, with headquarters at Allendale, Ont., and in 1923, following the amalgamation of the Grand Trunk and other lines in Canada to form the Canadian National, he was appointed bridge and building master of the Toronto Terminals division, later having his jurisdiction extended over part of the London division. For many years, Mr. Neville was active in the affairs of the American Railway Bridge and Building Association and served as president of this organization in 1937. He was also president of the International Railway Maintenance Club in 1935.

Obituary

Col. Theodore S. Pattison, division engineer on the Chesapeake & Ohio at Covington, Ky., until he was called for military service on February 16, as reported in the April issue, died at a U. S. Army hospital at Brooklyn, N.Y., May 1, after a short illness. Colonel Pattison was in charge of the New York Port of Embarkation at Brooklyn. A veteran of the first World War, he was a colonel on Gen. Pershing's staff. Col. Pattison entered the service of the C. & O. in 1927 as assistant division engineer at Chillicothe, Ohio.

Herman Overton Brown, chief engineer of the Sacramento Northern, with headquarters at Sacramento, Cal., died of a heart attack after a short illness on April 27. Mr. Brown was born at Lincoln, Neb., on September 3, 1876, and graduated from Colorado Agricultural College in 1898. He then entered railway service in the engineering department of the Denver & Rio Grande Western and in 1904 moved to California, and engaged in engineering work with the County of Los Angeles, and the Pacific Electric Railway. In 1911 he went with the Northern Electric Railway Company (now the Sacramento Northern) and in 1914 he was promoted to chief engineer.

Charles T. Nelson, retired supervisor of metal bridges of the Atlantic Coast Line, whose death at Florence, S.C., on April 26, was reported in the June issue, was born at Nelson, Ga., on September 28, 1864. For a time after he completed his public school education, Mr. Nelson worked with his father, a gunsmith, in the production of long rifles. In 1888 he entered the service of the Marietta & North Georgia, a narrow-gage line which was later rebuilt to standard gage, and which

was eventually incorporated into the Louisville & Nashville. During his service with this line, Mr. Nelson was engaged in work on wood and metal bridges, becoming foreman in charge of new work and reconstruction activities. In 1902 he entered the service of the Atlantic Coast Line as metal bridge foreman, in which capacity he had charge of the maintenance and repair of the company's metal structures and also of much of the new bridge construction on that part of the system between Richmond, Va., and Savannah, Ga. In 1919, he was appointed supervisor of metal bridges for the entire system, which position he held until his retirement from active service in August, 1935.

Harry Alfred Lane, chief engineer of the Baltimore & Ohio, with headquarters at Baltimore, Md., died at the Union Memorial hospital in that city on June 21 at the age of 66. Mr. Lane was born at Foxboro, Mass., on July 30, 1874, and attended Tufts College, receiving the degree of bachelor of science in civil engineering in 1897 and master of science in civil engineering in 1905. He entered railroad service as a rodman on the engineering corps of the New York, New Haven & Hartford, serving during summer vacations of 1895 and 1896. From June to September, 1897, Mr. Lane was employed by the Metropolitan Water Board, of Boston, Mass. From Ocober, 1897, to January, 1898, he served as a rodman on general surface line work for the West End street railway, Boston, and from January to September, 1898, he was a transitman in the maintenance of way department of the Fitchburg railroad (now part of the Boston & Maine) at Fitchburg, Mass. From September, 1898, to June, 1899, he was with the Foxboro (Mass.) Electric Company. Mr. Lane went with the New York, New Haven & Hartford in June, 1899, where he served as transitman, assistant to resident engineer and assistant engineer in charge of grade crossing elimination work. In December, 1902, he went with the Baltimore & Ohio, serving successively as office assistant on location surveys, field engineer, assistant engineer, assistant to chief engineer maintenance of way, assistant engineer of surveys, and assistant to chief engineer. In April, 1917, Mr. Lane became chief engineer of the Baltimore & Ohio.

Harry Alfred Lane

Association News

American Wood-Preservers' Association

The executive committee is poling members of the association to determine their attitude in regard to a proposed change in date of annual meeting from January to March or April, looking to a selection of a date which will stimulate attendance and avoid conflicts with meetings of other associations.

Track Supply Association

In addition to the firms listed in the July issue as having reserved space in the exhibit of the Track Supply Association in connection with the convention of the Roadmasters and Maintenance of Way Association at the Hotel Stevens at Chicago on September 16-18, George M. Hogan & Company have also taken space. Further inquiries indicate that 60 or more exhibitors will be represented this year, as compared with 55 companies which participated in the exhibit last year. The companies which have already arranged for space include several which will show their products at this convention for the first time. Further application should be addressed to L. Thomas, Secretary, The Q & C Company, 59 East Van Buren street, Chicago.

Roadmasters' Association

Officers and members of the executive committee of the Roadmasters and Maintenance of Way Association met in Chicago on July 21, with President J. J. Clutz, Vice-Presidents A. B. Hillman and E. L. Banion, Secretary F. O. Whiteman, Treasurer E. E. Crowley, executive committee members C. M. Burpee and H. E. Kirby, past president Elmer T. Howson, and committee chairmen W. B. Bailes and F. J. Meyer present.

After acting favorably on six applications for membership, the committee then devoted considerable attention to the problem of delinquent members. Detailed attention was given to the preparation of a program for the convention to be held at the Hotel Stevens, Chicago, on September 16-18, which will deal with the problems now confronting supervisory track officers. In addition to receiving the reports of committees, arrangements were made to invite railway officers to present addresses on problems of special importance, looking to making this convention essentially a "brass tacks" convention keyed to the problems of today. Preliminary reports of committees were also received and reviewed.

Bridge and Building Association

The Executive committee met in Chicago on July 28, with President H. M. Church; First Vice-President R. E. Dove; Second Vice-President F. H. Soothill; Secretary F. O. Whiteman; Directors R. E. Caudle, I. A. Moore, W. A. Sweet and N. D. Howard; Past Presidents A. E. Bechtelheimer, C. M. Burpee and Elmer T. Howson; and Committee chairmen Martin Meyer, L. C. Winkelhaus, J. P. Hanley, A. B. Chapman and Mr. Burpee, in attendance. R. Y. Barham, secretary of the Bridge and Building Supply Men's Association, also attended the meeting for a short time.

The principal activities of the meeting had to do with plans for the convention to be held at the Hotel Stevens, Chicago, on October 14-16, looking toward making this a most intensive meeting, designed to meet the particular problems of bridge, building and water service men at the present time. A program to this end was presented and the committee was instructed to arrange details. The meeting then reviewed in detail tentative reports prepared by committees for presentation at the convention and offered suggestions for incorporation in the final drafts of the reports.

B. & B. Supply Men

The officers and directors of the Association met in Chicago on August 1 to formulate plans for their exhibit to be held concurrently with the convention of the American Railway Bridge and Building Association at the Hotel Stevens, Chicago, on October 14-16. Secretary R. Y. Barham, of the Armco Railroad Sales Company, 310 So. Michigan avenue, has already received application for considerable exhibit space, which, with other indications, point to an unusually large and constructive exhibit.

American Railway Enginering Association

Four committees of the association held meetings during July, as follows: Economics of Railway Labor, at Minneapolis, Minn., and Duluth, on July 9 and 10; Water Service, Fire Protection and Sanitation, at Chicago, on July 10; Iron and Steel Structures, at Montreal, Que., on July 17 and 18; and Maintenance of Way Work Equipment, at New Haven, Conn., on July 21 and 22. Only two committees have thus far scheduled meetings for August, these being the Committee on Water Service, Fire Protection and Sanitation, at Chicago, on August 26, and the Committee on Buildings, at Toronto, Ont., on August 26 and 27.

The Board of Direction will meet in Chicago on August 19, and the General Committee of the Engineering division will meet in Chicago the following day. The principal business to be taken up at these meetings will be the consideration of requests of the various technical committees of the Association for funds for research work to be carried out in 1942.

Bulletin No. 425, containing, among other items, a monograph on the corrosion of rail and track fastenings in the Moffat tunnel, by A. E. Perlman, chief engineer of the Denver & Rio Grande Western; a monograph on rail corrugation, by H. H. Morgan, manager, rail and track fastenings department, Robert W. Hunt Company; and a preliminary report of the Committee on Ties, including tie renewal statistics for 1940, was distributed to the members in July. In addition, the loose-leaf supplements to the Manual, incorporating the action taken at the 1941 convention, and totaling 148 sheets, were mailed to holders of the Manual toward

the latter part of the month of July.

On September 1, the research staff of the former Committee on Stresses in Railroad Track, which was placed under the jurisdiction of G. M. Magee, research engineer of the Engineering division, at the time of the last convention when the Committee on Stresses in Railroad Track was abolished, will move from its present headquarters at the University of Illinois, Urbana, Ill., to the suite of the Association of American Railroads at 59 E. Van Buren street, Chicago.

Supply Trade News

Personal

Robert E. Dingman has been appointed manager of railway sales of the **Flintkote Company,** with headquarters at 30 Rockefeller Plaza, N.Y.

O. W. Carrick, assistant vice-president of the **Electro-Chemical Engineering Corporation,** Chicago, a subsidiary of the Dearborn Chemical Company, has resigned to retire in California.

Charles F. Fitts, first vice-president of the **Rodger Ballast Car Company,** with headquarters at Chicago, has been elected president of the company, with the same headquarters, succeeding **Harry S. Hart,** whose death on May 27 was noted in the July issue.

E. C. Gunther, who has been appointed district manager, midwest territory, of the **Duff-Norton Manufacturing Company,** with headquarters at Chicago, as reported

E. C. Gunther

in the July issue, was born in Chicago on February 5, 1899. He entered the employ of the Chicago, Burlington & Quincy in 1916 and since has held the positions of bookkeeper, tracing clerk, scrap clerk and buyer in the purchasing department.

Edwin C. Neville, whose retirement on June 13 as bridge and building master of the Toronto Terminals division and part of the London division of the Canadian National, was reported in the July issue, has been appointed a representative in Canada for the **Dur-Ite Company,** Chicago, with headquarters at Toronto, Ont.

Herbert J. Watt has been appointed manager of sales, western area, for the **Carnegie-Illinois Steel Corp.,** with headquarters in Chicago. Mr. Watt will coordinate sales activities of the company's offices at Chicago, Ill., Denver, Colo., Detroit, Mich., Indianapolis, Ind., Milwaukee, Wis., St. Louis, Mo., and St. Paul, Minn.

John S. Hutchins, who has been in charge of sales in the Chicago district for the **Ramapo Ajax** division of the **American Brake Shoe and Foundry Company,** New York, has been promoted to district sales manager for this division in charge of the entire middle west territory, with headquarters at Chicago, to succeed Paul Hoffman, retired. Mr. Hutchins was born at Arlington, Mass., on December 30, 1904, and after attending Yale University, entered the employ of Ramapo Ajax at Chicago in September, 1925. Two years later he was transferred from the plant to the

John S. Hutchins

sales department and in 1930 was moved to the Cleveland office. In 1933 he was placed in charge of sales in the Chicago district for the Ramapo Ajax division.

Obituary

Frederick E. Place, vice-president of the Buda Company, Harvey, Ill., died in Chicago on July 13.

George H. Jones, one of the founders of the **Inland Steel Co.,** died July 6 in his home in Chicago at the age of 85. In 1893 he joined in organizing the Inland Steel Co. Mr. Jones' first position with the company was that of vice-president; he was the chief executive officer and was also in charge of sales. He became second president in 1898 and served in that capacity until 1906. He then served in other executive positions until 1921 and continued as a director of the company since that time.

Robert J. Calder, president of the **International Creosoting & Construction Company,** Galveston, Texas, died on June 28 at Boerne, Texas. Mr. Calder was born at Richmond, Tex., on June 22, 1878. He was educated at the University of Texas and began his business career as a clerk on the wharves at Galveston. In 1901 he entered the employ of the International Creosoting & Construction Company as a clerk in the Beaumont offices and after holding various positions with the company, became president in January, 1923. He took an active interest in the work of

Robert J. Calder

the American Wood Preservers' Association, especially in its early days, and served as second vice-president of the organization in 1911.

Trade Publications

Schramm Compressor.—An illustrated leaflet, designated Bulletin 4120, has been issued by Schramm, Inc., West Chester, Pa., in which is described this company's Model 20 compressor. Specifications for this model are included.

Condensate Pumps.—A four-page illustrated folder describing its line of JZ single-stage condensate pumps has been issued by the Worthington Pump & Machinery Corporation, Harrison, N. J. This bulletin is known as W-325-B1.

I-R Air Tools and Compressors.—The Ingersoll-Rand Company, New York, is distributing a new catalog devoted to the line of equipment and tools manufactured by the company for use in railroad maintenance work. Entitled Air Tools and Compressors for Railroad Maintenance of Way, the new bulletin contains 24 pages and is profusely illustrated with photographs. The bulletin first deals with the line of portable compressors manufactured by this company, after which it lists and describes the different portable tools that are produced by the company for use in railway track, bridge and building work.

Safe Use of Wire Rope.—This is the title of a 24-page illustrated booklet which has been published by the Hazard Wire Rope division of the American Chain & Cable Co., Inc., Wilkes-Barre, Pa. An important feature of this booklet is a set of tables giving breaking strengths for different rope constructions, and, to permit safe loads to be determined, factors of safety are given for the principal rope applications. Constructive information is also given on the effects of acceleration; the different constructions and grades of wire rope; and various other factors bearing on the safety of wire rope, such as abrasion, bending fatigue, reverse bends, kinking, spooling, crushing, corrosion, porcupined outer wires, rope lubrication, rope attachments, and inspection.

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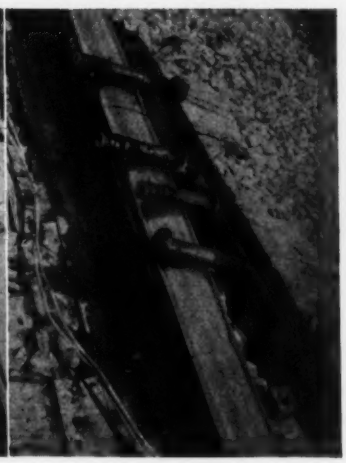
THE PENALTIES
OF RAIL JOINT CORROSION

R.M.C. PLASTIC also forms a sealing coating on the exposed surfaces, protecting the material in the joint from loss of any of its metal preserving qualities.

After 2½ years, this joint assembly was dismantled. The joint bar and rail were 100% free from corrosion.



Bolts from the joint at the left were as free from corrosion as when new, showing how R.M.C. reaches *concealed surfaces.*

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is a combined metal preserving compound and lubricant that will save . . . not only many dollars and much time . . . but also many "headaches" as you are called upon to keep track in top-notch condition for the still heavier traffic and higher speeds of the future.

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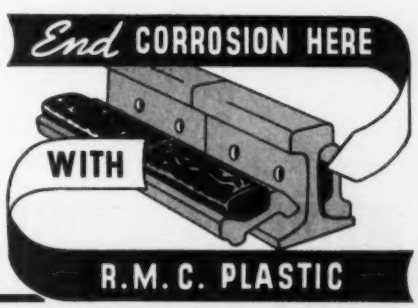
Why not start now to avoid future penalties of joint corrosion, such as "frozen" joints . . . excessive end batter . . . kinked and humped track, etc.

Write us—to learn how little this protection costs, and what it has done for other railroads where corrosion was experienced at its worst.



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Pittsburgh **Pennsylvania**

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Railway Engineering and Maintenance Goes Every Month to the **Chief Engineer,** to the **2 Division Engineers, to the 2 Supervisors of Bridges and Buildings, to the 6 Supervisors of Track and to 12 foremen and Other Subordinate Maintenance Officers** Who Are in Training for Promotion to Supervisory Positions on the Chicago & Eastern Illinois.

"Boss, since we're booked so far ahead, why can't we cut out our advertising and save that money? We'll get all the orders we can handle during the next year or two without it," said the star railway salesman to his railway sales manager.

"That's probably true, Bill," replied the sales manager. "We *can* save some money by stopping our advertising. And while we're talking about savings, we can cut out our insurance on our plant, too."

"Cut out our insurance! Are you serious, Boss?"

"Just as serious as you are, Bill."

"What if we'd have a fire and lose the plant?"

"We never have."

"But we might."

"Possibly—but, Bill, why do we need fire insurance?"

"It's protection, Boss, against a loss we might have."

"That's right, Bill, and so's advertising."

"How's that?"

"Simply this. Advertising in days like these is business insurance—protection against the possibility that our customers might forget all about us while we're unable to accept their orders."

"That's a new thought to me, Boss."

"But it's a sound one. Advertising keeps our name and our products before our customers. It's so easy for all of us to forget a concern in these hectic days. If you don't believe this, look at the firms that passed out after the last war. We can't afford to risk losing our *business* any more than we can risk losing our *plant*."

"That's right, Boss. And it's doubly true in the railway field for so many of the men who use and specify our product are located out on the line where it's hard to get to. That's where *Railway Engineering and Maintenance* helps us so much, for it reaches all these men wherever they're located. Take the Chicago & Eastern Illinois, for illustration. Not only does the chief engineer at Chicago read this magazine, but it goes also to the division engineers and the division supervisors of bridges and buildings at Danville and Salem, and also to the district supervisors of track at Chicago Heights, Danville, Marion, Villa Grove, Watseka and Evansville."

"That's right, Bill. It carries our message to men at eight different points on this one railway who are so scattered that it would take you a week and several hundred miles traveling to reach by personal call. That's the reason we're going to increase our schedule in that paper next year."

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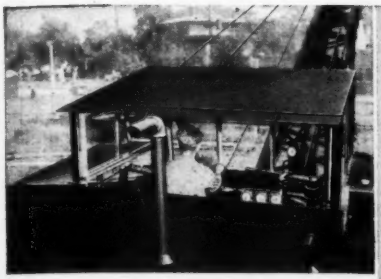
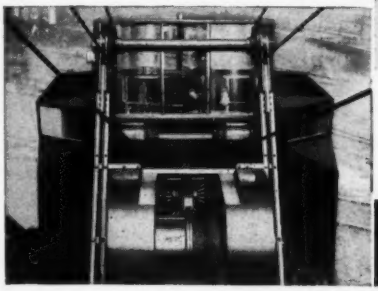
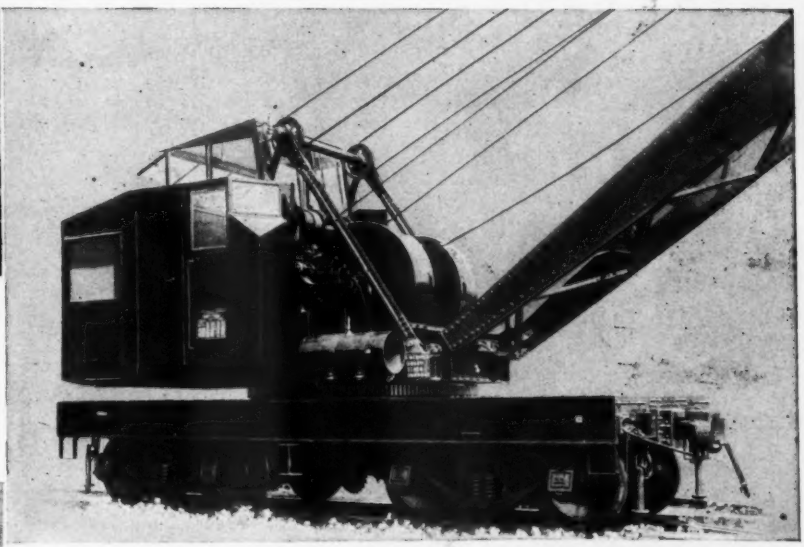


Above: Close-up of rear window showing the perfect ventilation and 360° visibility offered operator in Monitor type cab. This cab is standard on all I. B. gasoline and Diesel Cranes from 10 through 40 tons.

Below: Front view of Monitor type cab taken from half way up the boom. The Monitor type cab is an exclusive I. B. feature. Write today for further facts.





The new, patented, Industrial Brownhoist Monitor-type cab increases an operator's safety, comfort and efficiency. From the full-view windows the operator can see the tip of the boom and the rope coming off the drums. Ventilation is far better than in ordinary cabs, and at the same time noise is considerably reduced.

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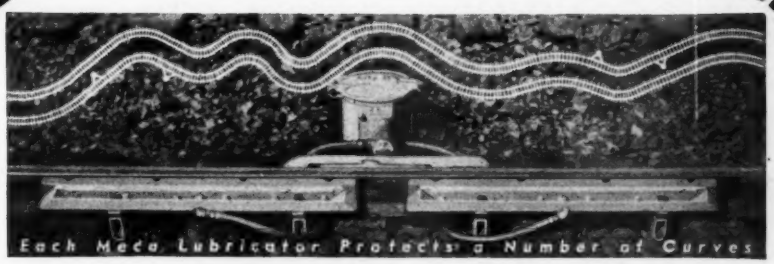

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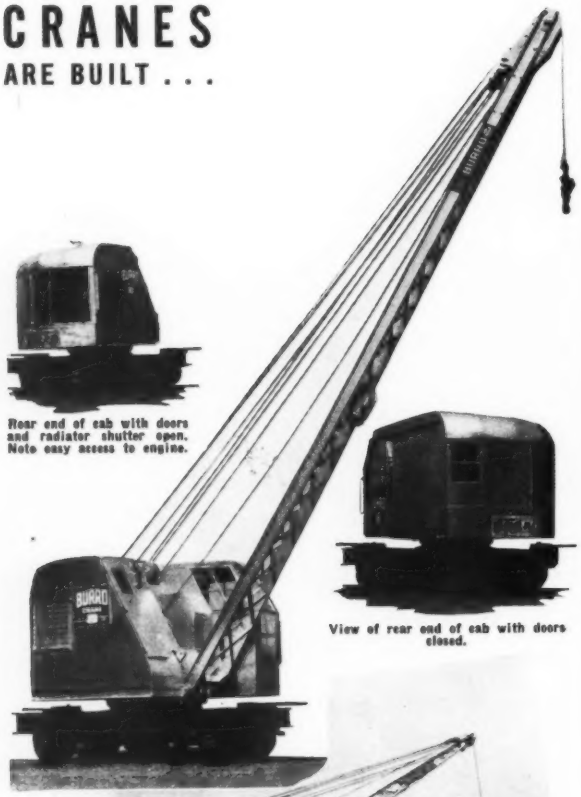
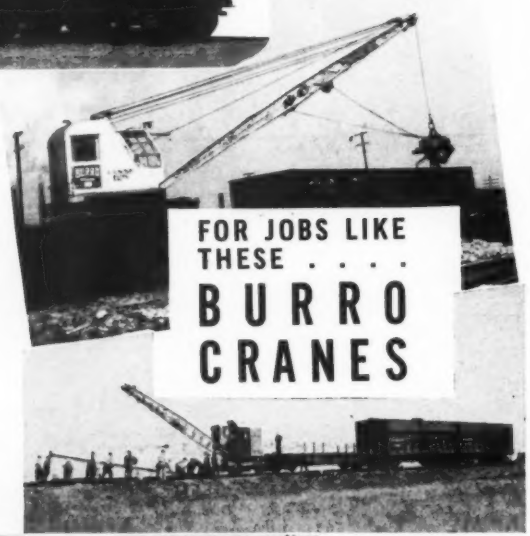


Rear end of cab with doors and radiator shutter open. Note easy access to engine.

View of rear end of cab with doors closed.



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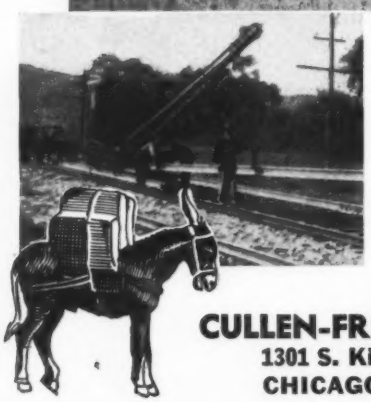

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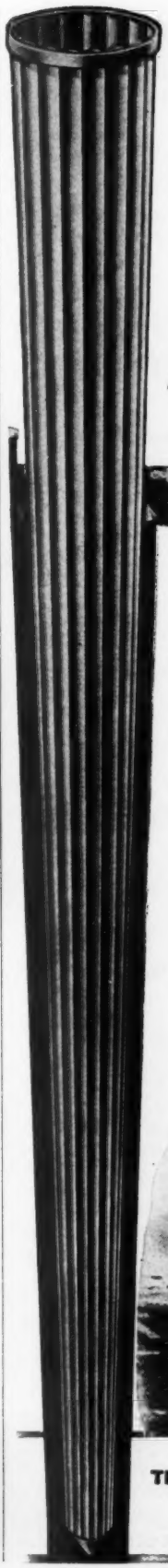

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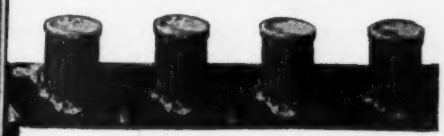

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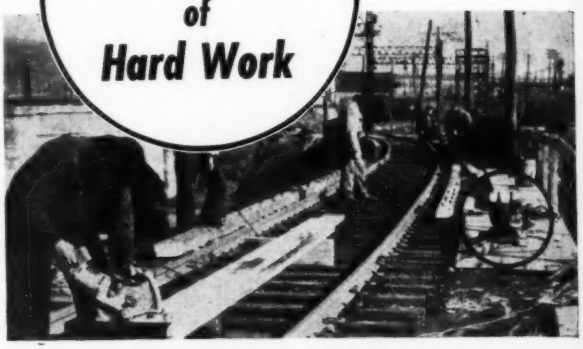

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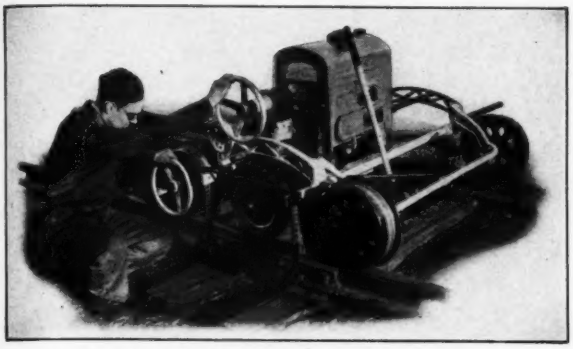

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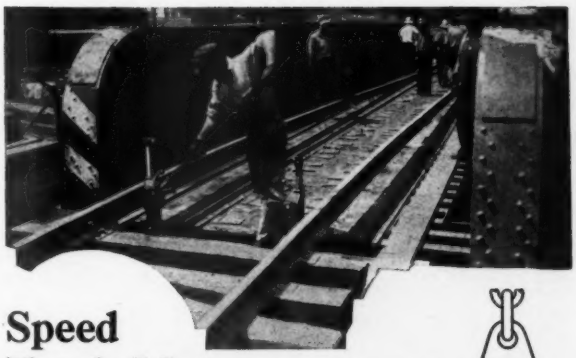

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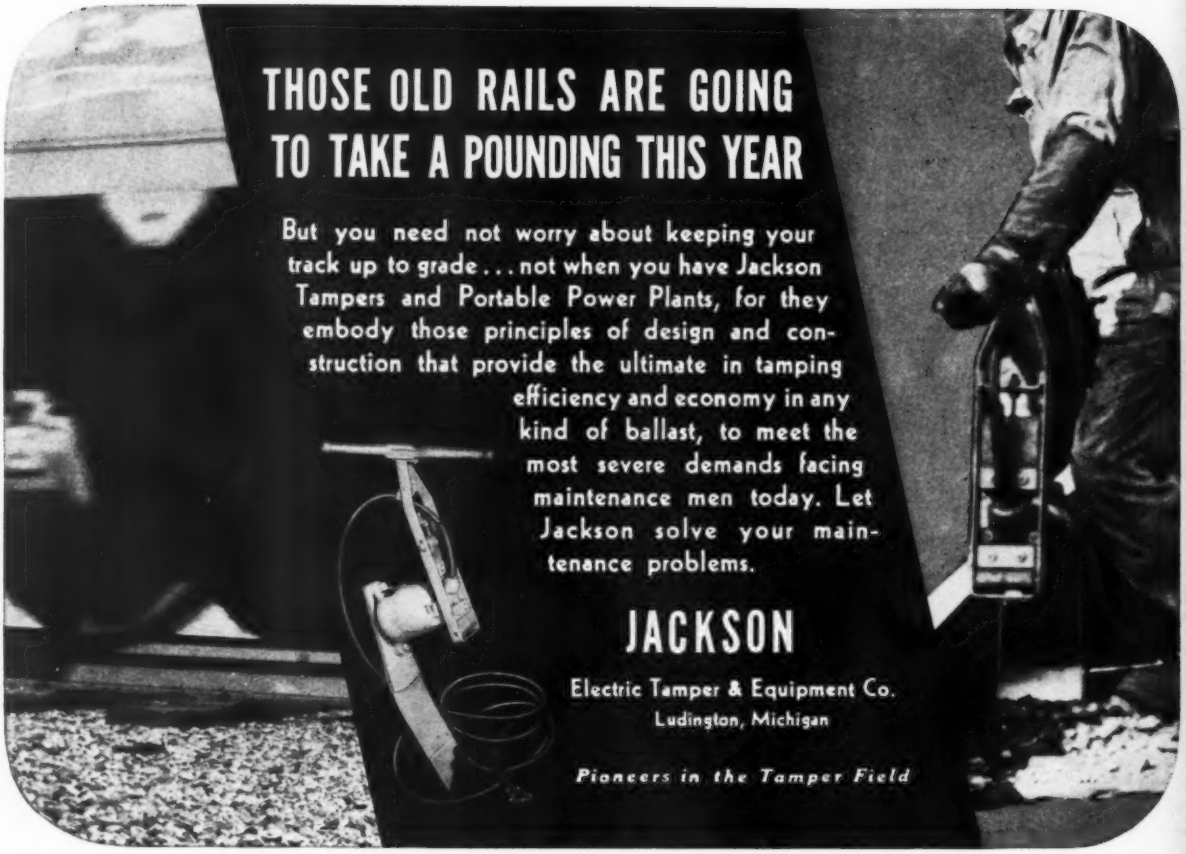
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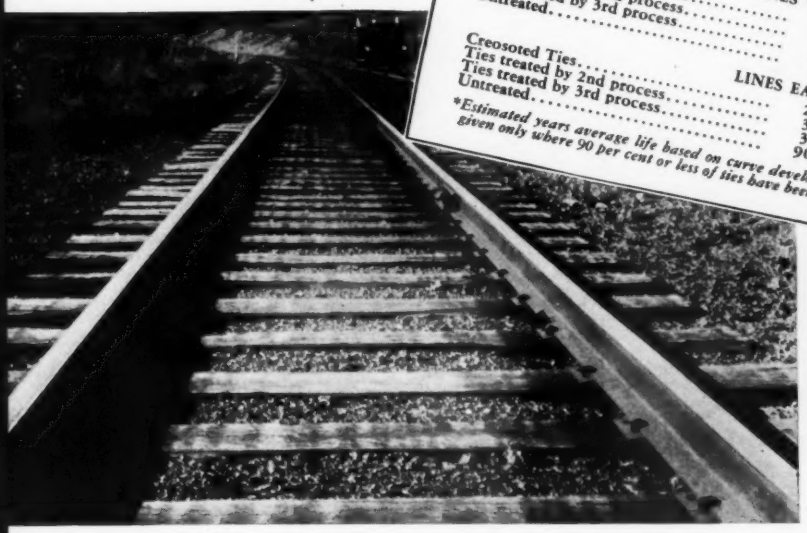

C. B. & Q. R.R. Track Test
31st Annual Report
SUMMARY OF 1940 INSPECTION
(Results of 30 years Service)

	Per Cent Ties Removed for Decay	Per Cent Ties Removed for Other Causes	Actual Avg. Life Years to Date
LINES WEST			
Creosoted Ties	17	53	28.5*
Ties treated by 2nd process	35	59	18.0
Ties treated by 3rd process	49	50	15.0
Untreated	91	9	5.8
LINES EAST			
Creosoted Ties	26	49	28.0*
Ties treated by 2nd process	35	60	19.1
Ties treated by 3rd process	35	44	16.1
Untreated	90	10	5.4

*Estimated years average life based on curve developed by Forest Products Laboratory and given only where 90 per cent or less of ties have been removed.

One of the test sections on the C.B. & Q. Thousands of experimental ties, treated and untreated, were installed in 1909 and 1910. As a rule, 1000 ties were placed in each lot, and at least one lot to each division.

Additional convincing evidence—if any is needed—of the economy and greatly extended life of treated ties in general and pressure-creosoted ties in particular, is furnished by the latest report on the famous track test of the C.B. & Q. R.R. It again shows an average life for creosoted ties of over 28 years.

Pressure-creosoted ties offer a sound and practical solution to some of the pressing problems that the railroads are facing today. As the president of one important road pointed out recently, management must take advantage of every potential method of reducing cost in order to meet keen competition and counteract relatively high labor costs and mounting taxation. Cross tie renewals constitute one of the major items of cost in maintaining track in this country. Treatment not only saves a large volume of material, but contributes substantially to the reduction in man-hours required for track repair.

It is estimated that railroads are already saving about $150,000,000 yearly through the use of pressure treated ties. Extending this use will bring greater savings, which will show up as operating profit. Our organization has the experience, men and equipment to serve you well.

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- ☐ "Pressure-treated Timber for Railroad Cars"
- ☐ "How to Measure the Quality of Pressure Treatment"
- ☐ "Laminex Prefabricated Pressure-creosoted Culverts"
- ☐ "Rings for Diesel Engines"
- ☐ "Locomotive Valve Packing"
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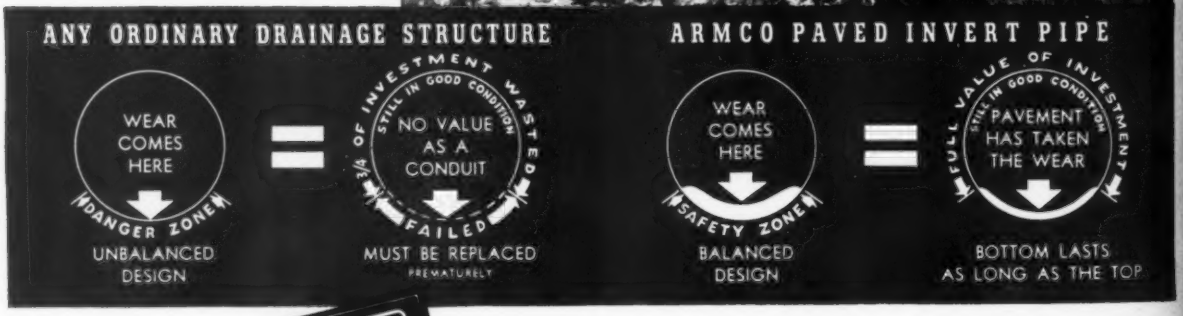

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